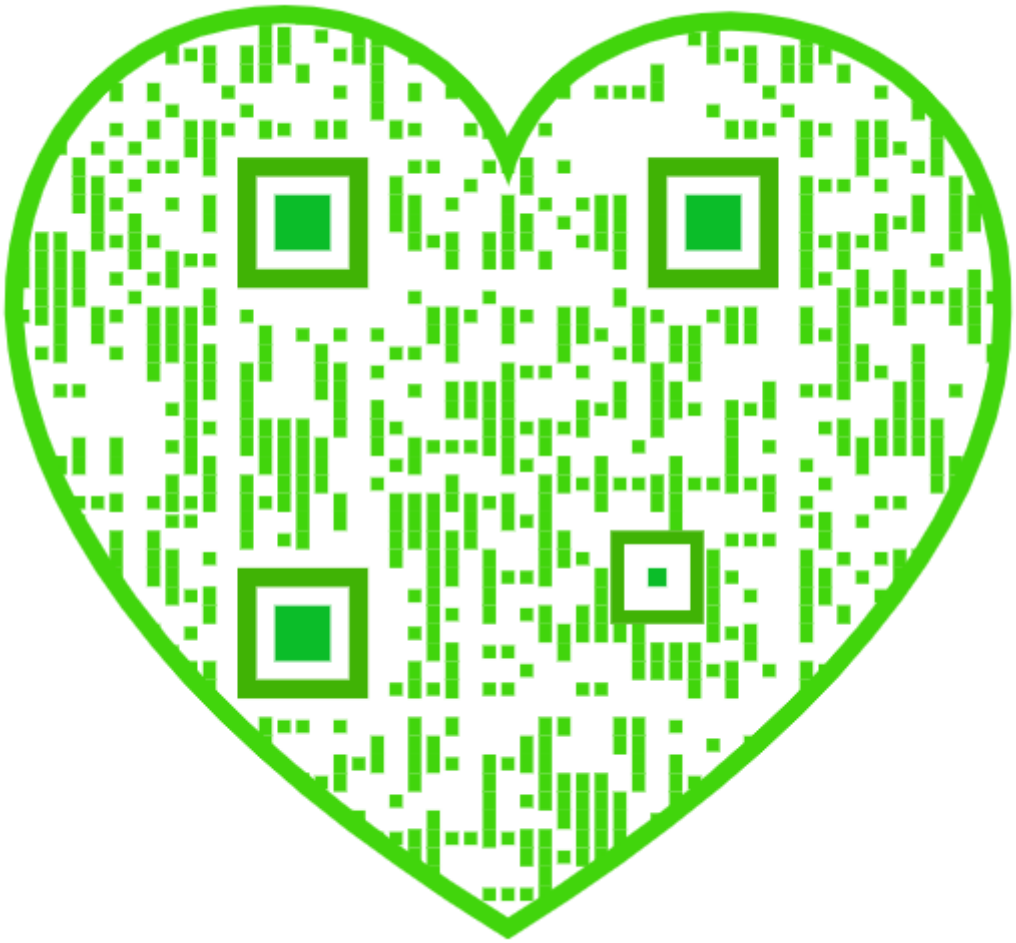
HOW *to* GROW VEGETABLES

ALLEN FRENCH



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HOW TO GROW VEGETABLES

The MC Co.

PLATE I. The Vegetable-Garden in September

In the latitude of Boston. In front, shrubbery and flowers

HOW TO GROW VEGETABLES AND GARDEN HERBS

A PRACTICAL HANDBOOK AND PLANTING TABLE FOR THE VEGETABLE GARDENER

BY

ALLEN FRENCH

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To A. K. D.
A Flower-Gardener

PUBLISHER'S NOTE

This is a new edition of the book previously published under the title "The Book of Vegetables."

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PREFACE

THIS book is designed to be of assistance to all who have to do with vegetable seeds, whether as buyers or as sellers.

When a beginner in vegetable-gardening, I was painfully aware of my need of a convenient and reliable planting-table, giving particular directions for the culture of all vegetables. I should have been saved mistakes both ludicrous and vexatious by such a book, the general value of which I can best illustrate by a quotation from the English "Book of Asparagus," by Charles Ilott (the John Lane Company, publishers). The author tells the following:

"Only a few weeks ago I was in a garden where there was a large bed of salsify. The owner was not satisfied with the plants, and told me he had changed his seedsman, because the salsify was poor and straggling. I examined the bed, and counted eight plants to the foot run. I turned to the other side of the bed, where broccoli was planted, and found them a foot apart from row to row and less in the rows. They were about three feet high, so I said, "Your broccoli is also a failure." "Yes," he said, "no more seed from Messrs. So-and-so." I said, "Are you not blaming your seedsman for your own ignorance?" He said, "Well, my

gardener is of the same opinion as myself." I asked to see the gardener. He replied that he had not one now, but wanted one. I replied, "Yes, you certainly do want one." . . . I then told him what I thought, and wondered how often our nurserymen and seedsmen are blamed for our incompetency."

This instance of the loss of a summer's work from mere ignorance of proper planting distances, is but an illustration of one of the several ways in which a crop of vegetables may be, if not ruined, at least greatly lessened. In the culture of almost every vegetable there is some point to be observed which is essential to real success. The deep planting of one seed is as necessary as the shallow planting of another; the tenderness and hardiness of plants must be understood and considered. Besides these there are many points of knowledge brought out by recent investigations—as for instance in the fertilization or protection of the crop—which aid in increasing the normal yield. In spite of the evident need, these items have never before been brought together in convenient form, thoroughly covering not merely classes of vegetables, but all the separate kinds.

This book is intended, therefore, for seedsmen and their customers, that both may get full benefit from the seeds, the latter in good crops, the former in continued custom.

That seedsmen have long recognized the need of such a book is evident from their catalogues, in which

they regularly publish brief directions for the culture of vegetables. These directions are, however, both short and incomplete, for in the space at their disposal the seedsmen cannot summarize all that it is of benefit to know of the culture of all vegetables.

At the same time the handbooks on vegetable culture, excellent as they are, treat vegetables as a rule in classes rather than individually, and do not mention many of the valuable sorts which are rare or of recent introduction.

Dates and methods, as here outlined, are proper for the climate of the northern United States. Generally speaking, in stating planting-times the latitude considered is that of the city of New York, but for other places the difference in season can be roughly worked out by allowing six days' difference for each hundred miles of latitude. This will not cover, of course, wide differences of altitude, so that these will often have to be considered. Moreover, our springs are uncertain and variable, so that the planting-times here given are but an average, and for each year the time of first planting will really be shown by the ground itself. "When the ground is fit," and "When the ground can be worked," are convenient gardeners' phrases, meaning when the frost is out and the ground sufficiently dry to be workable. This last will vary with local differences in soils, whether sandy (which is earliest), loamy (which is of medium season) or clayey (which is late).

With such local soil-conditions this book has nothing to do; if a man's soil is late it is both his misfortune and (if he has cultivated it for any length of time) his fault. He can improve it by the means suggested in the handbooks on gardening, or in the various government and state pamphlets, to which he is also referred for the general subject of soil-management. But if, as is most likely, his garden or his fields have soils differ-

Fig. 1. The old-style vegetable bed, and the back-breaking process of weeding. Nowadays vegetables are grown in rows.

ing in character, he can learn from this book in which particular spot a given plant will best thrive. Fortunately, while undoubtedly plants have preferences, it is possible to grow most of them successfully on average soil.

With each plant I have given a summary of its uses, its culture, and in case it is little known, its virtues. "Annual" means that a plant will, under natural conditions, go to seed and die in one season; "biennial"

means that the plant requires two years for developing its seed; "perennial" means that, however often the plant may produce seed, its root lives on for a number of years.

For each plant are given sowing-directions. I assume that nowadays no one grows vegetables in beds. Space is better utilized and labor is saved by growing the plants in drills or rows, except in the field-culture of various crops, sowed broadcast, with which this book has nothing to do. Broadcast sowing in the seed-bed is, of course, a recognized garden practice resorted to in special cases.

The proper distance of rows from each other is practically determined by the height and spread (whether above or below ground) of the plants: they should not crowd or shade each other. *The distances here given are the smallest which can safely be used for hand culture.* Convenience will in many cases lead the gardener to plant at greater distances if he has the space, while if he depends on horse-culture he must plant still farther apart, usually thirty inches at the least. That is his affair. This book is intended to help not only the man with plenty of room, but also the man who, by means of intensive cultivation, must get all he can from a small patch.

Indicating the distances that seed should be sown in the rows is intended to help in economizing seed as well as in the saving of labor. It is wasteful to sow an

ounce of seed if a packet will do the work; and it is exasperating to spend time in thinning what never should have been sown. A "good stand" of anything makes troublesome thinning; while in the case of asparagus, unless early and savagely thinned, extermination of the superfluous plants is impossible without digging out their crowns.

I suppose I need hardly say that seed should be fresh, and bought of a reliable dealer. If a gardener wishes to sow old seed, he should first test its viability. The simplest method is to lay a given number of seed between moist cloths, in a tin box or between two dinner-plates laid edge to edge; the percentage of germination is thus easily found.

As for the dealer, there is no excuse for not buying of one of the many reputable city houses, all of which prepay mail charges on seed ordered by the ounce or packet. Grocery-store seed is too often old and poor.

It would be of value if I could give here the number of feet of drill that an ounce of a given seed will sow, or the number of plants that an ounce will produce, but this subject has never, so far as I have found, been reliably and extensively tested. Seedsmen's statements on this point are (as I learn from the experiments of Professor Bailey, and from my own experience) merely guesses on the safe side. One ounce of the seed of corn-salad, often quoted as enough for fifty feet of row, is really, if good weight, enough for at least two hundred

feet. An ounce of good asparagus seed, traditionally equal to sixty feet of drill, will really sow five times as much. I have not, however, been able to study this matter thoroughly, and in the absence of reliable data I have not ventured to give, under each heading, the number of plants or feet of row that can be got from an ounce of seed. I have, however, appended a table of supposed ounce-values, which may be of some help to a gardener in making his list of purchases. Accurate corrections will be welcome.

The depth of planting makes little difference in the case of some seeds, but much in others. Celery seed sown too deep, for instance, will never come up, so that ignorant sowing may mean the loss of the chance to raise a crop. At the same time, again, summer peas planted too shallow are in danger of mildew. It is well, therefore, to pay attention to this matter.

Thinning is a subject which is too little considered. It requires some heroism to thin properly, even with experience of the results. My quotation from Ilott shows the value of thinning, which should always be rigorously practiced. The distances here given are usually the least that can safely be allowed, for the advantage, as above, of the man with a small garden. But even he must thin, for however rich his ground may be, no man can raise two prime parsnips, for instance, where there is room for but one.

In the body of the book I have given none of the

common cultural directions. Here let me say that I assume that every autumn the ground will be deeply ploughed or dug over, and that in spring it will be put in good surface-condition for sowing. During the growing season I assume that weeds will not be allowed to grow, and that after rains, and between them whenever necessary, the surface of the soil will be stirred with the hoe, rake, or cultivator, to kill the sprouting weeds and to preserve the surface-mulch.

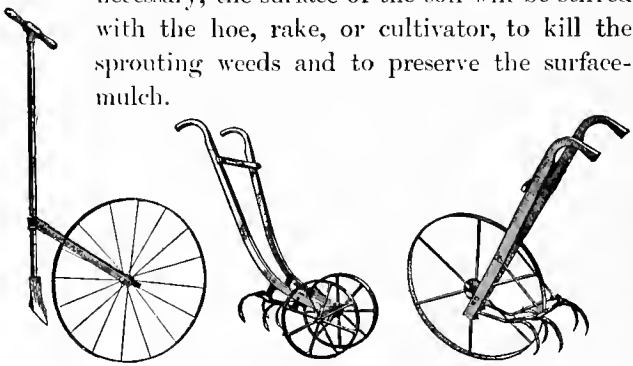

Fig. 2. Types of wheel-hoes, or hand cultivators.

This surface-mulch may be defined—for the benefit of the beginner—as a dust blanket above the moist earth, to prevent its drying out. For it may be broadly said that so long as the ground looks wet it is losing its moisture, while as soon as the surface has been broken and refined to powder the evaporation is stopped. This work is done, on small areas, by the hoe and rake, and on larger areas by the cultivator. The garden must be a small one in which the hand-cultivator, or wheel-hoe, will not soon save its cost in economy of time and

The Spring Fitting of Fall-ploughed Land by means of the Spading Harrow

In small gardens the work is done by the spading fork and hand-cultivator

labor, while in a large garden the horse-cultivator is a necessity. Regular and persistent cultivation is essential to success in gardening, and is the best of the two methods for bringing the garden through a drought.

The other method, irrigation, is laborious, expensive, and seldom entirely successful. It is best applied by leading the water alongside the plants in furrows dug for the purpose; the ground should be soaked, the furrows closed and mulched. But for an ordinary drought cultivation is sufficient.

Besides cultivating regularly, I assume that all gardeners keep their soil rich by generous applications of manure or chemical fertilizers—preferably both. A few plants seem to be injured by overfeeding, especially those root-crops which suffer upon ground that has been recently manured. These plants I have indicated, but in general all plants thrive best upon rich soil, and the oft-repeated rule for vegetable gardens is: Give too much, in order to be sure to have enough.

Such directions for fertilizing as I have given in the book are (over and above the necessary general fertilizing) for the special needs of special crops. Knowledge of this subject is however as yet too inexact for me to be in all cases either positive or precise. Experiment stations all over the country are at present working upon this problem of fertilizers for special crops, a solution of which problem will take fewer dollars from the farmers' pockets and put more into them—but that

millenium has not yet come. Even where I have given specific directions, it is to be remembered that these, for extensive gardening, will always be modified by soil-conditions.

For the general subject of fertilizers I refer my readers to Professor Edward B. Voorhees' standard book upon the subject, to his Farmers' Bulletion No. 44, and to the reports of himself and others in the bulletins of the New Jersey, Vermont, Connecticut, Delaware, Maine, and Rhode Island experiment stations. The study of the question of home-mixed fertilizers I commend to all who are interested in fertilizer economy and the improvement of their crops. For general gardening purposes they will find Professor Voorhees' "basic fertilizer mixture" (nitrogen 4 per cent, phosphoric acid 8 per cent, potash 10 per cent) one of the best. I assume that even the beginner will master the difference between high-grade and low-grade fertilizers.

Manure is a necessity for successful vegetable gardening. The general subject of Barnyard Manure is treated in Farmers' Bulletin No. 192. (Farmers' Bulletins may be obtained free, by applying to the Secretary of Agriculture, Washington, D. C.) For a fall dressing fresh manure may be applied, but usually only well-rotted manure, or what the English call "short" manure, is proper to use in the garden. Good manure is valuable; the man who owns horses or cows will cure his manure carefully under cover, while the man who

does not keep stock will be fortunate if he can buy well-cured manure.

"Liquid manure," as spoken of in this book, can be conveniently made by immersing a bag of fresh horse-manure in a tub of water. The product is strong in nitrogen, and is excellent as an application to plants which are expected to make a good stalk and leaf growth. The liquid manure should be applied dilute, and in small quantities; it should be put upon the ground, and never upon the plant itself.

Nitrate of soda is much used for the same purpose, should also be sparingly applied, and not upon the plant. It may be strewed upon the ground, to be carried to the roots by the rains, or may first be dissolved in water. Nitrate of soda and liquid manure are always best applied in occasional small doses, rather than in larger ones at greater intervals, on account of the danger of over-stimulating the plants, as well as of loss of fertilizer by leaching.

For seed-sowing I assume that the practice is as follows. The soil being well pulverized to the depth of a foot or more, the drill is dug to the required depth, the seed is scattered or laid within it at the proper distances, the soil is raked upon the seeds (without disturbing them) and *made firm by pressure* (by treading or rolling), and then the row is mulched lightly with loose earth to keep it from baking or drying out. In case the soil is very dry it is well first to fill the furrow

with water, and after this has drained away to scatter in moist but not wet earth before sowing the seed. That the moisture of the ground shall reach the seeds, firming the ground upon them is imperative.

A still better method of hand-sowing consists in making the drill deeper than directed, scattering along it some good chemical fertilizer, rich in nitrogen, and covering this with earth before sowing the seed, which direct contact with the chemical would injure. The fertilizer, thus placed, gives the plants the much-desired "quick start," with a supply of food for later growth.

Many gardeners use seed-drills, which dig the furrow, sow the seed, cover it, and firm the ground, all in one operation, with great economy of time. In a large garden, with long rows, seed-drills are valuable. The row should always be mulched with the rake after sowing. If the seed-drill is used, fertilizer cannot be sowed underneath the seed, and the plant must depend upon the food already present in the soil, or upon chemicals scattered alongside the rows. Machines have been made, however, for sowing fertilizers alongside drilled seeds, and although the fertilizer will not be, as best, beneath the plants, it will doubtless benefit them.

In sowing in hills the seeds should be a few inches apart, in a little circle, so that when thinned one seedling will not pull another up. Make the circle larger or smaller according to the number of plants that are to remain, and to their eventual size. Seed-drills are

made to sow seed in hills, but where the time and labor can be spared, hand-sowing is better.

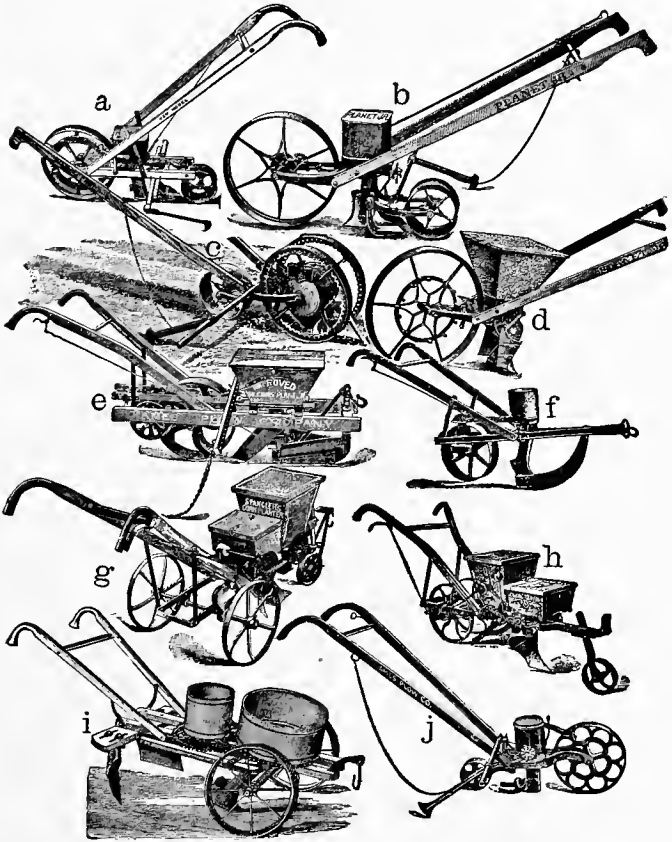

Fig. 3. Styles of seed-drills for hand- and horse-power, for general or special purposes.

A seed-bed, here frequently mentioned, is a specially prepared plot of ground, warm, light, "quick," well-drained, and in the best possible tilth. It is used for bringing young plants on rapidly. Seed-bed methods should be studied in the handbooks, where also are explained the methods of raising plants under glass. If a gardener possesses nothing more than a small cold-frame he can save himself much time and labor, and can greatly hasten the maturity of many of his plants, while hotbeds and a greenhouse will assist him still more.

For transplanting and picking I have given particular directions wherever necessary. Detailed directions for transplanting must be sought in the handbooks; generally it may be said: Move each plant with as large a ball of earth around its roots as possible, and trim off about a third of its top, or even more. Water after setting (the depth may usually be a little deeper than before), firm the earth well, and if the sun is very strong give shade for a day or two when the sun is overhead or while the plants show weakness. A light dose of nitrate of soda or liquid manure after setting will often help to the new start. Mulch at once, and cultivate.

The direction: "*when well up*," is here frequently used to indicate the time when plants should be thinned or transplanted. The term is a variable one, and the gardener must develop his judgment in the matter.

Generally, for thinning the term means when the young plants have developed three or four true leaves and are growing well. For transplanting, six or more true leaves are usually necessary.

The list of vegetables given in the book I have endeavored to make complete, including in it all which are likely to be grown in our climate, even by the experimenter. Besides the well-known vegetables and herbs, I have added to the list not only those plants which, while little known, are yet carried by American seedsmen, but also some which are not yet offered here. Of these, some may never be known in America beyond a few individual importers of curious seeds, but others are deserving of our notice.

And I cannot help adding here a plea for a wider trial of the little-known vegetables. It is too much to expect that the American farmer will ever add more than one or two to his very limited list of poorly-grown garden truck; I appeal more to vegetable-gardeners who do their work for the fun as well as the benefit of it. The best vegetables in our country are grown, not on farms nor even in large market-gardens, but in the thousands of small home gardens that surround our cities. From these gardens to the simple home table go dishes fit for the traditional king, but the owners of these gardens are still somewhat limited by national habit and local knowledge. If by making plain the culture of the less-known vegetables this book aids in

their introduction, I shall consider that it has done a good deal. There are European delicacies such as the globe artichoke, celeriac, cardoon, sea-kale, and chard, each one of which has strong points of individuality to distinguish it from most of our vegetables, as well as some consideration of delicacy, flavor, season, or copious yield to make it worth a place in any kitchen-garden. Indeed, to say nothing of these vegetables, which are known here chiefly among our foreign population, there are others long known to us, of which the virtues are not universally appreciated, for the Jerusalem artichoke is still but an incidental crop, and in many parts of the country carrots are grown chiefly for cattle, their finer varieties being entirely unknown. If but our common vegetables become better known by means of this book, even then it will have served a useful purpose.

There is so much, besides, in a proper handling of the vegetables which we already have, that if this book only helps to improve their culture it will have done enough. The planting distances and depths, the soil in which, the fertilizer by which, the particular method through which the best results can be won—proper knowledge of these is enough to increase by half the yield of many a garden. Finally, if those who use the old methods—or none at all—against pests and diseases would but avail themselves of modern knowledge, they on their parts would mightily increase their harvests. I have endeavored to include all the practical

protective measures; they can be further studied in the bulletins of the federal government and of the different states, as well as in recent handbooks, notably Smith's "Economic Entomology," and Lodeman's "The Spraying of Plants." I have no hesitation in recommending any vegetable gardener to purchase these books, and to provide himself with a spraying outfit suitable to the size of his garden, whether the outfit consist of a power sprayer or merely of a whisk broom.

Fig. 4. A knapsack spray-pump, one of the various convenient hand-power devices.

In the names of plants I have followed the usage of the Cyclopedia of American Horticulture, giving cross references from local or popular names.

I have not concerned myself with plant varieties or varietal names, which are often merely of local importance and appear and disappear rapidly. I have, however, given the classes into which the varieties fall (as pole and bush beans, early and late cabbage, tall and dwarf peas), with directions for their different treatment. For a choice of varieties, I advise beginners to choose a good seedsman and depend upon his advice,

and to go slow in buying novelties. Some wise man has said that the value of a variety is inversely as the space given to it in the dealer's catalogue.

Besides my own experience I have consulted many gardening authorities. The seedsmen's catalogues above mentioned, whose brief directions are not to be despised; the state and government bulletins; the columns of the garden magazines; various monographs; Mrs. Fullerton's "How to Make a Vegetable Garden"; the latest excellent edition of Vilmorin-Andrieux's "The Vegetable Garden"; those two English authorities, Thompson's "Gardener's Assistant" and Nicholson's "Cyclopedia of Horticulture"; Peter Henderson's two books; and particularly Professor L. H. Bailey's "Principles of Vegetable Gardening," his various handbooks, and the "Cyclopedia of American Horticulture," edited by him and by Wilhelm Miller—all these have been carefully consulted in preparing this book, and to them I make cordial acknowledgment of indebtedness.

My book is intended to be a supplement to the more complete treatises upon the general subject of vegetable gardening. It gives much that they omit, and purposely omits much that they include. In the hope of perfecting the book, I will gladly receive corrections and suggestions from any of its readers.

ALLEN FRENCH.

CONCORD, MASSACHUSETTS,
March, 1907.

HOW TO GROW VEGETABLES

PLANTING TABLE

AGRIMONY (*Agrimonia Eupatoria*). Agrimony is a hardy perennial herb, grown for its astringent and aromatic leaves, which were formerly much used in domestic medicine. The plant is now but little grown, and few seedsmen offer the seed. It is raised from seed, but preferably from root-divisions. See also Feverfew.

Soil.—Any good earth.

Distances.—Rows two feet apart, plants eighteen inches in the rows.

Sow when the ground is fit, thinly, the depth about an inch. Or sow in seed-bed and transplant.

Thin when the plants are well up.

Set roots in spring.

Pick as wanted when the plants are well grown, or dry and store.

Renew or root-prune when the plants show less vigor.

AGRIMONY, HEMP. See Thoroughwort.

ALECOST. See Costmary.

ANGELICA. A perennial sweet herb (*Angelica officinalis* or *A. archangelica*) once used in medicine on account of supposed angelic virtues. Grown for its leaves and stems, which are candied; occasionally used as a pot-herb.

Soil should be rich, deep and moist.

Sow in fall, or in a seed-bed in spring, thinly in rows one foot apart.

Depth, about one inch.

Thin to three to four inches.

Transplant when twelve to fifteen inches tall, or in the next spring, to two feet by eighteen inches.

Picking may be begun during the second summer, when the plants are well established. Gather the leaves at intervals until the flower-stalks appear (in the second or third summer), when cut down the whole plant, and use the tender parts. It should give another picking in the fall, and will sometimes bear an inferior crop the following spring.

Renew from seed, planting every two or three years. The plants are useless after they have flowered.

ANISE is *Pimpinella anisum*, an annual condimental herb grown for its seeds, which are used chiefly in flavoring, but also in perfumes, confectionery, cordials, and in American fox-hunting. No varieties are offered, and no serious pests or diseases reported.

Soil should be a sandy loam.

Sow when frosts are past, thickly, in drills one foot apart.

Depth, one-half to one inch.

Thin to three inches when three to four inches high.

Gather the seed when ripe, late in summer.

ARNICA (*Arnica montana*). Arnica is a hardy, dwarfish, perennial herb, grown for the tincture made from its leaves, or occasionally from its roots, used as an application for bruises, or internally as a tonic. Arnica is propagated by seed or by root-division. In Europe the plant is called Mountain Tobacco or Mountain Snuff.

Soil.—Any garden earth.

Distances.—Rows twelve to eighteen inches apart. Thin to six or nine inches.

Sow when frosts are past, or in April or May under glass or in a protected seed-bed. Prick out, harden off, and set out when frosts are past. Thin field-sown plants when well up.

Set roots when the ground is fit.

Pick leaves as wanted. For winter use make the tincture and keep in bottles.

Protect lightly in severe climates.

Renew or reset when the plants seem weak.

ARTICHOKE, GLOBE or FRENCH. A perennial plant, *Cynara scolymus*, allied to the thistle, and grown

for its flower-heads, which, when young, are picked and cooked, pickled, or (with some varieties) eaten raw. Plantations should be renewed every two to four years; in fact, for the most prosperous management of a plantation, parts of it should be renewed yearly. In planting, quickest and best results are obtained from suckers; but American seedsmen chiefly offer seed, which

Fig. 5. Globe Artichoke seedlings. Two-thirds natural size.

does not always come true. The plant is hardy but requires protection in our climate. By proper management, a bed will yield from early summer until frost. Chards, properly so called (see Chard), are made by blanching the large leaves of the plant; but, as this greatly weakens the root, it is best done on plants which are not expected to bear again. Varieties (of which few are offered in America) differ in size, color and earliness. No serious diseases or pests are reported.

Soil should be deep, rich, moist but not wet.

Distances, rows three to five feet apart; plants two to four feet in the row, according to variety.

Depth, one-half to one inch.

Sow seed under glass in March or April. Pricked out into pots, to avoid setting back, and set out-of-doors when frosts are past, seedlings should give edible heads the same summer.

Sown outdoors in early May, either in *hills* where the plants are to stand (distances as above, five or six seeds in a hill, thin to one in a hill) or in a *seed-bed* (drills eighteen inches to two feet apart, seeds one-half inch apart; thin to twelve to eighteen inches when well up), and transplanted the next spring to their permanent positions, the plants will not give edible heads till the second summer.

Culture.—If not in a moist place, preserve the surface mulch with care, and water in drought.

Fertilizing.—Beyond regular enriching of the soil, no special fertilizer is required, unless plants are to be brought into their third or fourth year, when they should be fed heavily. Seedlings, and old plants in spring, respond well to nitrate of soda or to liquid manure.

In the fall of the first year, cut down the plants, and mulch over winter. If banked with earth, protect the heart of the plant from dirt by tying over it its own leaves.

Treatment of the established bed.—In spring uncover

each plant, and dress around it, if possible, with manure or fertilizer. When the shoots start, cut out (taking with each a part of the root, and cutting clean) all but the best three or four, leaving these to make the year's crop without crowding.

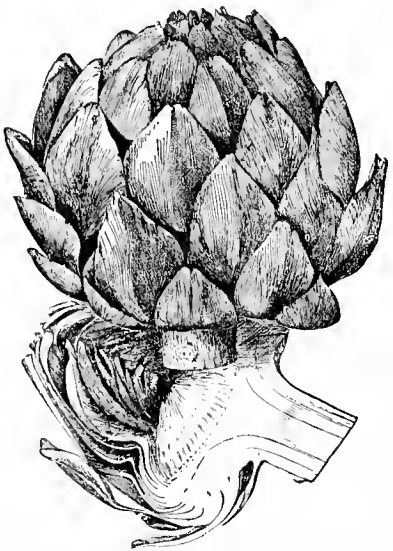

Fig. 6. Heads of Globe Artichoke. The edible parts are the base of the head and the bottoms of the large leaves. One-half natural size.

The cuttings, or suckers, or stools, are used to make new plants, which will give edible heads before fall. Set either at the above distances, or in a seed-bed two feet by one foot, and plant out in early summer. Set the cuttings a little deeper than before, and, if they have leaved out, trim the leaves back. Protect against early frost and drought.

Picking.—The heads should be cut before they open and show the flower. If cut too late, they are tough and useless. Even if not wanted, they should be cut for the sake of later heads. Cut the stems back to

the ground, and a second growth is possible the same season.

The management of the bed, if well done, will give a continuous supply from early summer. Take cuttings at the opening of spring. The well-established plants flower first, and should then be cut back. Other strong plants, if cut back a few times in spring (and any new sprouts cut out), will flower in midsummer, and by the time that they have finished the cuttings will be ready to bear. In fall will come the second crop from the early-bearing plants.

Chards can be made (preferably from old plants) by cutting back leaves and all after the first picking, and when the large leaves have well started again, tying them by their tips, in a sheaf, and covering all but the tips with straw or hay, which is held in place by tying and with a little earth. The leaves will be properly blanched in about a month.

In the fall the stems and large leaves of old plants should be cut down, the smaller leaves tied together over the heart of the plant, and the whole mulched with manure, litter or earth.

Renew from seed or by cuttings. Do not keep plants after their fourth year.

Use.—The bottoms of the flower-heads and of the large outer leaves of the flowers are the edible parts. Of Chards, eat the midribs.

ARTICHOKE, JAPANESE (or CHINESE), is *Stachys tuberifera*, which see.

ARTICHOKE, JERUSALEM. A tall plant, *Helianthus tuberosus*, of the sunflower family, grown for its tubers, from which (since it does not produce seed well except in warm countries) it is grown. The tubers are gathered in the spring or fall; left in the ground after the second spring they will sprout and become troublesome, but can be eradicated by swine or by cultivation.

Fig. 7. Tuber of Jerusalem Artichoke. One-fourth natural size.

The artichoke will grow on poor land, and its advantages should be more generally understood. Of equal value with the potato as food, the Jerusalem artichoke is easier to cultivate and more productive, while stalks, leaves and tubers may be fed to stock. No choice of varieties is offered by our dealers, but there are improved French and Brazilian strains. Under good conditions 600 to 1,000 bushels per acre have been harvested. Diseases and pests are seldom troublesome.

Soil.—The plant will grow on any soil that is not wet, but prefers a sandy soil, well drained; it will thrive on a poor or even gravelly soil, but if fed well will repay the expense.

Distances.—Rows three to five feet apart; plants

in the row, eighteen inches to two feet. Or plant three by three feet.

Depth, two inches.

Plant usually whole tubers, or, if small, two or three together. If the tubers are large, they may be cut to two eyes. Plant as soon as the ground can be worked, or set out in the fall.

Culture.—After a few early cultivations, the plant will usually shade the ground and take care of itself. For best results, take off all flowers.

Harvesting.—The plant needs a season of five months, to which slow growth has been ascribed its power of resisting drought. Dig when the tops are dead, taking care to get out all the tubers. Or leave in the ground over winter, and dig in the spring.

Store in pits with less protection than for other root-crops. In cellars keep from air and light by storing in sand, as the artichokes will shrivel and turn black.

Use like potato. Vilmorin-Andrieux recommends it baked. When boiled it is excellent for salads.

ASPARAGUS (*Asparagus officinalis*), as our longest-lived vegetable (a bed is expected to last a generation, and an English bed ninety years old has been reported), repays and demands much care in its early stages. While it requires and responds to heavy feeding, the old-time methods of deep trenching and heavy manur-

ing before planting have been proved to be unnecessary, thus putting asparagus, for home culture, within the reach of every one who can spare the space.

The habit of the plant is curious. Through the summer it accumulates, in its large storage-roots, the supply of energy to carry it through the heavy cutting of the following spring, when for weeks its crown, or central portion, makes shoots, only to have them cut as fast as they appear. Its storage-roots lie near the crown; the feeding roots branch from them in all directions and go to considerable distances. These feeding roots were formerly supplied with a great store of food by the growers, who packed manure solidly in deep trenches underneath the plants. It is now known that manure and fertilizer, worked into the upper few inches of the ground, are enough for the plant, so that the heavy initial expense of setting is no longer undertaken.

Asparagus is a hardy plant, and, though originally found near the seashore, it will grow on many soils. It is grown from seed, which by the old-time careless methods gave fair results. The method of deep planting, described below, is best for the home garden, as the plants are more vigorous and better able to resist rust. Thinning should be carefully attended to, for while at a few inches the tops of the plants will not interfere, at nine inches the roots are still likely to crowd. Deep planting where the plants are to stand

will save a year in their culture; commonly, however, the plants are grown in a seed-bed for their first year, to save space, and are then transplanted. Transplanting from the seedbed at the end of the *first* year is advisable; it has been proved that two-year plants (although

Fig. 8. Seedlings of Asparagus. Natural size.

commonly offered for sale by dealers) in the long run produce less than yearling plants. (See Farmers' Bulletin, No. 61.)

The setting of the plants should be carefully done. They should be given plenty of space in their permanent positions; three feet by two is as little as should be given, for good results, since in a few years the roots will fill the whole space. While for commercial planting the roots are merely cast into furrows, right side up,

for garden practice the careful setting of the roots in trenches is advisable. The depth of setting, which formerly was as much as eighteen inches (delaying the start in spring and more than doubling the length of each shoot, most of which was wasted) is now about six or eight inches.

Fig. 9. Shoot of Asparagus

Once set, the plants are usually allowed to grow for two years before cutting, although even then the cutting in the third year should be light. It is possible, however, with plants sown deep and not transplanted, to take a light cutting in the third year from seed. Cutting should never be so heavy as to exhaust the plant; the rotation described below is advisable for all plantations of any size, and the cutting season (which commercial growers occasionally prolong until July) is best finished soon after the middle of June. It is the habit of some gardeners to stop cutting Asparagus when the first green peas are ready to pick, thus allowing one delicacy to supplant another. Blanching for cutting is easily done, and varies, commercially, with the market demand.

The number of roots to be set out depends upon the family requirements. Ma-

ture plants, under the best conditions, will sometimes yield three shoots daily. Shoots counting nine to the bunch are on record. It is safer, however, to count on two shoots to the plant, twenty to the bunch, in which case, with ideal gardening conditions, ten plants will yield a bunch a day.

But in setting out a bed it must be remembered that there are periods of immaturity and old age when the yield is small, so that it would be wiser to count on twenty to twenty-five plants to the bunch as an average yield. And finally, if the growing, feeding, and care of the plants are not to be of the very best, fifty to sixty plants to the bunch may be necessary.

The daily yield depends much upon the weather, cold nights often temporarily checking growth.

The life of a bed depends upon the feeding of the plants, their distance apart, and the severity of cutting. Good commercial growers seldom keep a bed longer than fifteen years; for the home garden, where greater care may be given, and the cutting is moderate, the plants may be kept considerably longer, or say twenty years, in good bearing, although many beds of much longer life are known.

The replanting of a bed may be done on the same ground, by taking out alternate plants or rows of plants and putting in new, so that the bed will still yield a small crop.

Varieties of Asparagus are few and not very sharply

distinguished; results with any of them depend largely upon feeding, culture, and protection from pests and diseases. It is claimed that the Palmetto and Argenteuil best resist rust; but all varieties are more or less susceptible to the disease, and experiment stations are now endeavoring to breed rust-proof kinds.

Asparagus pests are not very troublesome; they should, however, be rigorously suppressed, as by weakening the plants they make them less able to resist the rust. This, a fungous disease, has of late years spread alarmingly from section to section, until in places it has almost exterminated the Asparagus industry. Its control is now, however, better understood. In practice, there is no need to distinguish between the forms of rust.

Soil.—Although Asparagus will grow on any soil that is not actually wet or very stiff, it does best on sandy soil, well drained. A heavy land should be lightened by working in sand or sifted coal ashes; if wet it should be underdrained. For its preparation, see below.

Permanent distances.—The rows should not be less than three feet apart; four feet is better; for field culture five to six feet is convenient. Plants in the row should not stand closer than eighteen inches; two feet is better; three feet is not too much. In fact, up to planting four by five feet, Asparagus plants have not too much space, and in a few years the roots will

PLATE II. Asparagus Root
In its trench, staked and set, ready for covering

occupy the whole of it. For blanching, the rows should not be closer than four feet.

From seed.—A gardener who wishes the best results will do well to grow his own plants. Seed-bed culture should be as follows:

Choose rich, well-drained land in good tilth and freed of weeds by a few hoeings; sow the seed as soon as the ground is fit if necessary, but best after the weeds have sprouted and been killed. Soak the seed.

Sow the seed very sparsely, not nearer than an inch apart, at a depth of an inch; rows should be eighteen inches or more apart. As soon as the plants have sprouted, thin to as much space as can be given to the plants, one foot if possible. Three inches apart is the least space that should be given in the seed-bed.

Deep planting gives much better results; on the same land the deep-sown plants have in the same season resisted rust for some weeks later than the shallow-sown. For this reason, as well as to save the labor of transplanting in the second spring, plants should be sown where they are to stand, if the space can be spared. There is no economy in not giving the space, as deep-sown plants will yield a light cutting in the third year from seed, as stated above.

By this method sow the seed in trenches, six to eight inches below the surface; cover with an inch of soil. Sow the seeds an inch apart, or sow several seeds near each other at the permanent distances. Thin to

one foot if possible when the plants have well started, or to one plant at each hill.

Give clean culture during the season, gradually filling in the trenches to about half their depth. In the fall fill them completely. For the sake of clean culture it is possible to take a crop of low-growing plants between the Asparagus in the first year.

By this method, twice as many plants may be grown in the row as are needed, if thinned to one foot apart. In the second spring, every other plant may be dug out without injury to the remainder. The lifted plants may be set in another row; it will take them some time to catch up with the others, which will yield in the third spring, while the transplanted plants should not be cut until their fourth. Of either set of plants the first cutting should be very light.

Plants grown by this method should be large and vigorous at the end of the first year, fully equal in size to two-year plants grown closely together by ordinary seed-bed methods.

Thinning is, with Asparagus, a difficult matter; it is not sufficient merely to pull the tops. The crowns are formed almost at once, each with a single storage root, so that at even a few weeks the plants are able to send up other shoots if the first are pulled. It is therefore necessary that the crowns should be pulled with the tops; if the plants grow to any size, the crowns must be dug out, a tedious process.

After planting, keep the ground from baking. The seeds are of very slow germination, and sometimes quick-germinating seeds are sown with them to mark the row. These should be sown only for this purpose, however, very thinly, and not for a crop; as soon as the Asparagus shows the other plants should be pulled, and thinning begun.

For the first year feed the plants well, give clean culture, keep free of pests, spray against rust, and in the fall cut down the tops and burn.

Asparagus under glass.—Excellent plants for the home garden may be raised by sowing three or four seeds in four-inch pots, thin to one in a pot; or by sowing in flats and carefully pricking out into pots. Harden off and set out when severe frosts are over; set two feet by eighteen inches for transplanting the following year, or set where the plants are to stand, depth six to eight inches; fill in the trenches during the summer.

Carefully selected pot-grown plants, started in March and set out in May at full depth, as here described, will give quicker results than any other plants.

Preparing for the permanent bed.—Make the soil as good as possible, in richness and in physical texture. Use old manure to an almost unlimited extent, adding (to make it a complete fertilizer) per ton a hundredweight of Florida superphosphate and thirty-five

pounds of muriate or high-grade sulphate of potash (or other chemicals supplying the same amount of available phosphoric acid and potash). At the same time it may be remembered that Asparagus may be raised in any ordinarily rich soil.

The soil should be in the best of tilth and free of weeds. If very clayey, it would be well to work in a considerable amount of sand or fine coal-ashes. If acid, it should be limed. Subsoiling is not necessary except with a wet soil; but in case of a high water-table it would be wise to under-drain.

Where there is a choice, the land should have a southerly exposure, and in any case should be open to the sun all day.

In buying plants, go to a reputable dealer, and if possible to one in the immediate neighborhood. Get plants, if possible, from an unrusted field. *Only yearling plants should be used*; tests have proved that the future yield will be much larger.

Setting.—Furrows should be made eight inches in depth, and widened at the bottom to about a foot. In these, at the required distances, the roots should be placed upon little hummocks made by the hand and patted firm. *The depth of the crowns* will then be about six to seven inches. Spread the roots out evenly so as not to interfere or crowd, and cover immediately with about three inches of soil; press down firmly, and scatter a little earth loosely for a mulch. A pint of

water to settle the earth, and allowed to drain away before firming, will be beneficial. (While the water is draining, a second plant can be set, covered and watered. Return to the first, firm the earth and mulch it; set a third plant before finishing the second.)

Time of setting.—Fall setting is occasionally practiced; spring setting is usual. Set in the fall when the tops are thoroughly dry. Set in spring as soon as possible after the ground is fit.

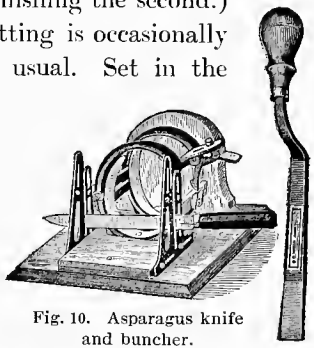

Fig. 10. Asparagus knife and buncher.

Before setting, the plants should be kept from drying.—While Asparagus roots do stand much neglect when out of the ground, any drying is to their detriment. Until planting, they should be kept moist; if raised at home, only a few should be dug at a time, and these should be covered from wind and sun, carried to their permanent positions, and set at once.

Staking.—It is a good practice, easily followed on small areas, to stake each plant. Set inch stakes or strong bamboos before covering the roots. When the tops are well up, tie them loosely to the stakes, and tie again as they grow. The wind, moving the tops, cannot loosen the crown in the earth. After the first year staking is not necessary, except in exposed situations where the wind may break the stalks.

Cultivation, for the first year, consists in filling in the trenches as the plants grow, if possible with a good compost, until *in late fall* the ground is level. Water during any drought, and every two weeks dress lightly with nitrate of soda, or water with liquid manure. Watch closely for pests and rust, and treat as directed below. For fall treatment, see Fall Manuring.

Let the transpanted plants grow two years before cutting. Cut earlier, they lose vigor.

Cutting in the third year, if done at all, should be for not more than two weeks. It is wiser to wait until the fourth year. During the fourth spring, and regularly thereafter, cut clean, allowing no stalks to grow up to about the middle of June. Some growers cut till nearly the first of July. It is a good practice to follow a rotation in cutting, stopping early each year on various parts of the plantation, to give the plants a rest. More than seven weeks' cutting is never advisable.

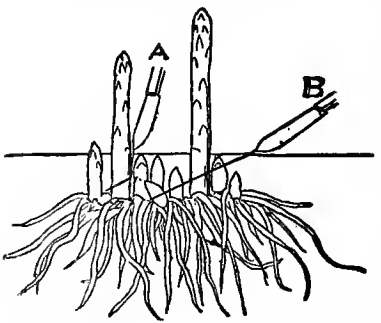

Fig. 11. Good and poor methods of cutting Asparagus. Thrust the knife into the ground as vertically as possible, in order not to injure other shoots or the crown.

Method of cutting.—The asparagus-knife is the usual implement, though pocket-, table- or pruning-

knives are also used. Thrust the knife into the ground beside the shoot, and cut it off obliquely as low as possible, taking care not to injure other shoots or the crown of the plant. Two to three inches below ground is usual.

Cut every shoot, whether needed or not. For green asparagus, the shoots are commonly cut when six or seven inches above ground. For blanched, cut the shoot as soon as it appears, first removing some of the earth by hand, so as to cut eight inches or more below the surface.

Breaking the shoots is practiced in Europe, parts of England, and by many good growers in America. It is the best method in home gardens, as only the tender part is broken off, and other parts of the plant cannot be injured. Break the shoots off squarely as low down as possible.

Shallow planting (leaving the crowns two inches deep) is the usual method in France (where probably is grown the best Asparagus in the world) and is advocated by some in England and America. Its great advantage is an early start to the plants; the danger in the method is injury to the crown and brittle roots by cultivation. If the crowns are near the surface the shoots must be picked by hand: by a gentle twist, or by thrusting the finger behind the base of the shoot and pushing gently outward from the crown, it can be broken from its socket, no part being left to decay in the ground. If

shoots of any length are required, the plants must be earthed up during the cutting season.

Blanching, which is practiced in many localities, consists in earthing up the plants a foot or more. The shoots are broken or cut as above.

Fertilizing.—(1) *Fall Manuring.*—In the old practice, still followed by many, the bed is manured every fall. As many commercial growers use no manure whatever, it is evident that the manure is not needed as a protection, even for shallow-planted roots. Much of the available fertilizing elements is lost by leaching. On the other hand, the manure helps an early start by preventing deep freezing. Fresh manure may be used.

(2) *Spring and summer manuring.*—Manure is, however, valuable in the Asparagus bed for its humus and its physical benefit to the soil. Early spring manuring, acting as a mulch and keeping the ground cool, may delay the start of the plants, unless the manure is at once worked deeply into the ground. Manure is best applied immediately after the cutting season, and should be spread between the rows, rather than upon them, as thus the food reaches the feeding roots rather than the heavy storage roots surrounding the crown. The manure is then valuable as a summer mulch, and should not be worked in deeply; a mixture of cow and horse manure is preferred by some growers. Applications may be heavy; generally speaking, Asparagus will take twice the amount of fertilizer usually given

to root crops. (But, against this practice, see under Cultivation for Rust.)

(3) *Chemical fertilizers* should always supplement manure, in the proportion per ton as given under Preparing the Permanent Bed. But

Chemicals may be used without manure, mixed in the formula 4 per cent nitrogen, 8 per cent phosphoric acid, 10 per cent potash, 1,000 to 1,500 pounds per acre. Apply this before setting, and each spring, with an additional top-dressing, after the cutting season, per acre at least 250 pounds nitrate of soda, 300 of superphosphates, and the equivalent of 100 pounds of actual potash. (Voorhees.) Other formulæ give a larger per cent of potash. A good spring dressing consists of 450 pounds Peruvian (Chincha) guano and 400 pounds muriate of potash per acre.

Nitrogen applied in April will benefit the season's crop if there is sufficient rain to carry the food to the roots. But it is probable that nitrogen is best distributed through the year, either as nitrate of soda or as liquid manure.

Manure versus chemicals is summarized in Farmers' Bulletin No. 233; "If the land is in good condition a well-balanced commercial fertilizer may produce as good yields as manure and be cheaper." Notice the *if;* manure helps to keep the land in good condition.

Common salt, frequently advocated, is never to be used on clay soils, and in general its value is not proven,

though recent Arkansas experiments are in its favor. Kainit, which contains potash with salt, is probably more valuable.

Berries should be stripped off as soon as set, wherever practicable, because in ripening they take strength from the root, they harbor the twelve-spotted beetle, and if they ripen and fall they will produce troublesome "volunteer asparagus."

Seed may be raised as in Farmers' Bulletin No. 61.

General culture.—(1) *In the spring.*—Cultivate as thoroughly and as deeply as possible without touching the roots or the crown. Fertilize as above, earth up if blanching is required.

(2) *After the cutting season*, cultivate thoroughly, and, if the plants have been earthed up, level off the field. Give an application of nitrate of soda or liquid manure, and give between the plants and not over the crowns the heaviest general dressing of the year.

(3) *In the fall.*—Strip off the berries before they ripen, and burn them. It is a good cleanly garden habit to cut the tops *when wholly dead*, in the late fall or early winter, and burn them. Good commercial growers now leave the tops for winter protection, and harrow them into the ground in spring; but for the garden they are too coarse to use thus, and if the bed is manured in the fall the tops are not needed for protection. All sap should have left them before cutting.

Uncovering the crowns.—It is the French practice, to uncover the crowns in the fall and to carefully cut away the stems left from the season's cutting. This is not to be done except with shallow-set plants, and with the greatest care not to injure the crowns. It is sometimes recommended to hoe away from the crowns, in the fall, all but a few inches of soil, to give the plants an early start in the spring. Rather than have the plants winter-killed, it is evidently better, for northern culture, to hoe away the earth early in the spring if at all, and, when the plant has well started, to gradually work the earth back again while cultivating.

Forcing.—(1) *Under glass.*—For this purpose the roots are taken up in the fall, allowed to freeze but not to dry out, and when wanted are put in earth in mild hotbeds or in greenhouses. Cut the shoots as they grow; cover from the light for blanching. The best roots for this method are three-year, grown three feet by two feet, and not transplanted; they are useless after forcing. Ether forcing (see under Rhubarb) might be successful here.

(2) *In the field.*—Half-barrels may be placed over the plants and fresh manure piled around them; or sashes may be placed above the plants, which for this purpose are grown closer than ordinary. Elaborate systems of brick trenches between the rows, with open pipes running from trench to trench, are used abroad; manure is put in the trenches and furnishes the heat,

Or steam pipes may be laid underneath or alongside the rows.

These methods are all for field-forcing early in the spring. *Winter forcing* is possible in houses temporarily built over the plants, or by the method (of doubtful profit) described in Farmers' Bulletin No. 84. Here trenches were made between the rows, covered with manure and boards, and steam injected at intervals.

Let forced plants rest for a year.

Diseases.—The rust, a fungous disease, is a serious enemy to Asparagus over a widening area. Against it, the plants should, first of all, be kept growing vigorously by feeding well and by cultivation.

Cultivation for rust is now considered a promising remedy, and recent results point to its helpfulness. By cultivating every week or ten days, the spores in the ground are turned to the surface, germinate, and die. With this method, summer mulching with manure is impossible.

Wide planting for rust is now suggested, so that the sun and the wind may get at the plants and the earth. Set the plants six by two feet.

Burning the tops is now discarded as a remedy for rust. If the tops are cut before their fine leaves fall, the roots will be injured by the loss of sap. If the leaves are allowed to fall, they will put so many spores in the ground that a few million more, from the stalks, will make no difference.

Spraying for rust gives some promise with Bordeaux (1 to 8 formula, 40 gallons) and resin solution (resin five pounds, potash lye 1 pound, fish-oil 1 pint, water 5 gallons; prepare as under Cabbage Pests. Two gallons of this mixed with 8 gallons of water should be added to the Bordeaux). Or, instead of resin solution, use resin soap. (Dissolve 7 pounds sal-soda in 4 to 5 gallons of water, and boil; add 10 pounds resin, and continue boiling until (about a half-hour) the resin is completely dissolved; the result is a yellow soap in the bottom and a clear liquid above. Pour off the liquid and save the soap. For use, dissolve 2 pounds of the soap in 10 gallons of water and add to the Bordeaux as above, 40 gallons.) For experiment and special sprayer, see New York Agricultural Experiment Station Bulletin, No. 188.

Sulphur treatment for rust (see California Bulletin, No. 165) is valuable chiefly in the Californian climate. Sow flowers of sulphur when the dew is on and the air quiet.

Against anthracnose, apply Bordeaux. Other European fungous diseases have not yet reached America.

Pests are the two Asparagus beetles,—the common and the twelve-spotted. Against them: (1) Poultry. (2) During cutting season leave scattered shoots to grow as traps. Kill with insecticide, or cut down and burn. (3) After cutting season, or on young plants, dust fresh air-slaked lime or arsenites, or both, on the

plants while the dew is on. Repeat whenever larvæ reappear. (4) In hot weather, shake or brush the larvæ from the plants; they will die on the hot earth. (5) Against twelve-spotted beetle, pick off the young berries and burn.

The lady-bug, the two soldier-bugs, and various wasps and dragon-flies, prey on the common beetle. The Asparagus fly, a European pest, has not yet appeared here.

For the Asparagus Miner, which works underground, no remedy is as yet known. The pest does no great harm.

Storing of Asparagus may be done by canning or by drying. Can as directed in the cook-books. Stalks of uniform sizes may be strung and hung in the sun, or dried over the stove. Keep in a dry place, and when wanted for use soak and cook.

AUBERGINE. See Eggplant.

BALM (*Melissa officinalis*) is a perennial plant, raised from seed, slips or root-divisions, and grown for its leaves, which are used in seasoning and for scents, and for Balm tea and Balm wine. The taste is like lemon.

Soil should best be light and warm.

Sow in spring in seed-bed, thinly, one-half to one inch deep, and transplant to one by two feet. Or sow

thinly where the plants are to stand, rows two feet apart, and when well up, thin to one foot.

Set roots or slips one by two feet, in spring.

Pick the leaves as wanted, after the plants are well established. For tea and wine, use the tender stalks as well as the leaves. Cut down the whole plant in the fall; leaves and stalks may be dried for winter use.

Renew as the plants show less vigor.

BASIL, or Sweet Basil (*Ocimum basilicum*), is an annual herb, the leaves of which are used in seasoning, tasting of cloves. The several varieties mentioned by European writers are seldom offered here.

Soil, a warm light loam, well enriched.

Distances.—Rows one foot apart; plants six to eight inches in the rows.

Sow under glass in April; prick out or pot. Set outdoors when frosts are past. Or sow in the open ground late in May, thinly.

Depth, one-half to one inch.

Thin or transplant to the above distances.

Pick the leaves and shoots as required. When in bloom, cut the whole plant and dry in the house. Cut again in fall.

Potting.—Basil may be potted and kept in a warm room, where it will yield through the winter.

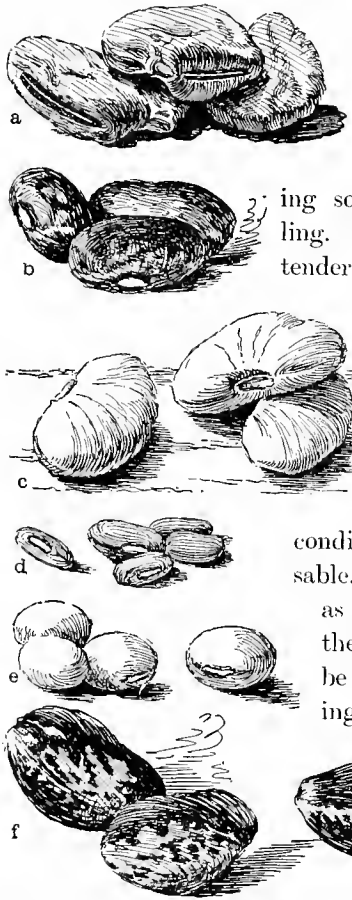

Fig. 12. Types of Beans, natural size. *a*. Broad Beans. *b*. Kidney Beans. *c*. Limas. *d*. Dolichos Beans. *e*. Soy Beans. *f*. Scarlet Runner.

BEANS are leguminous plants of allied genera, most important in garden culture, falling into classes requiring somewhat different handling. Most of them are very tender to frost, and some do not do well in our climate, —the Windsor because the summer is too hot, the Lima because it is too short. They are all, however, cultivable in the North under proper conditions, and are indispensable. Certain of them, such as the Scarlet Runner and the Dwarf Limas, should be better known, as giving greater variety.

For culinary purposes, Beans divide into two classes, —the edible-podded and

the tough-podded, or shell Beans. The edible-podded are eaten, pods and all, before the Beans are full grown; they are commonly called snap or string Beans, but the "strings" are undesirable, and should develop only as the pods grow old. In the best varieties, the young pods are thick and easily break clean across. The shell Beans are eaten when full-grown but before they dry. Snap Beans, when mature, are often used as shell Beans. Of both kinds the seed can be left to ripen on the vines, and when dry can be picked, shelled and stored for winter use.

General rules, applicable to the culture of all Beans, are here given.

Do not brush against the vines when they are wet.

Fertilizer.—A general fertilizer for Beans should contain chiefly potash and phosphoric acid. Beans get most of their nitrogen from the air, and if over-stimulated will run to vine; but a little nitrogen should be either in the fertilizer or else applied alone before sowing or just after the seedlings appear above ground. On unmanured soil, a fertilizer with available per cents of nitrogen 1.3, phosphoric acid 8.7, potash 12.5, may be recommended.

Soils vary somewhat according to the kind of Bean, the Lima requiring the lightest, the Windsor doing better on heavier land. Generally speaking, soil for Beans should not have been freshly manured, even with well-rotted manure; compost is much to be preferred.

Diseases.—For anthracnose, buy sound seed, avoid low, damp ground, pick and burn all diseased plants. Spray with Bordeaux (weak, containing 1.5 per cent of copper sulphate) and keep the foliage covered with it. Or spray with sulphur in water. For rust, Bordeaux. For Lima-blight, spray with "some clear copper compound" (Lodeman) two or three times before the disease is expected.

Pests.—If the weevil attacks the plant, treat the seed, as soon as picked, with bisulphide of carbon in a closed vessel; give two or three applications three to four weeks apart. Or heat to 145° Fahr. for an hour. Seed so treated may be safely sown. Destroy all rubbish of the patch, especially all unused seed. Sow none but seed free of the pest; or sow in the drills sifted coal ashes, or sand saturated with carbolic acid. Scatter suspected seed lightly in water before sowing, and reject all that floats.

For leaf-beetle, hand-picking, pyrethrum, arsenical sprays, clean culture.

For blister-beetles, spray at their first appearance with Paris Green mixed with ten to twenty parts of flour or air-slaked lime or plaster, or with ten gallons Bordeaux or whitewash to an ounce of the poison. When the beetles come in numbers, catch in butterfly-nets or drive before the wind into a windrow of straw or rubbish, and burn. Or beat into pans containing kerosene or coal-oil. Act promptly.

For Bean lady-bird, Paris Green with lime as above, or kerosene emulsion, as an underspray. For all caterpillars, arsenites, hand picking. For boll-worm, arsenites, late plowing.

If arsenites are used with string beans, wash the pods carefully before cooking.

Varieties of Beans are innumerable. For cultural purposes they divide into the classes which follow.

Fig. 18. Seedlings of Broad Bean. Two-thirds natural size.

Except the broad Bean, they are all tender to frost. The only perennial is the Scarlet Runner. The pods of the best snap Beans are waxy in texture, green or yellow in color. Shell Beans are frequently mottled.

(1) The **Broad Bean** (*Vicia Faba*), a shell Bean, of which the best known type is the Windsor Bean, is the

Bean of the ancients, still grown in Europe, but little adapted to our dry, hot summers, since it needs a long, cool season. It is a very hardy plant, and in mild climates the seed may be left in the ground over winter. The Broad Beans are not offered by all American seedsmen, and only the more progressive dealers offer any variety, of which the chief classes are tall and dwarf. While this Bean may be grown in some parts of the country, in general it cannot compare with the Lima.

Soil.—Any good soil, preferably a moist deep loam, not over-rich in nitrogen.

Distances.—Drills apart two to three feet, according to variety. Seed in the row three to four inches. Hills of tall varieties, four by four feet; six to eight seeds in the hill.

Depth should be two inches in the early season, three inches later.

Thin hills to three or four plants.

Sowing.—Soak the seed for earlier sprouting. For an especially early crop, Broad Beans were formerly sown in the fall. It is better to sow under glass in February and plant out when well hardened as soon as the ground is fit. Sow outdoors in early spring, and earth up slightly against late frosts.

Culture.—Preserve the moisture of a shallow soil, and water in a drought. Tall varieties should be given support. When well in flower, pinch off the ends of the plants if they are growing fast.

Pick when the Beans are full-sized, but before the pods dry.

Fertilize as above.

Succession. — Start the first crop under glass, as above; sow the second when the ground is fit. Of this second sowing, cut back a part just before flowering and they will yield later. Cut back other plants after cropping, and they will give a second sparser crop in the fall.

Fig. 14. Seedlings of Kidney Bean. Two-thirds natural size.

(2) **Kidney Beans** (*Phaseolus vulgaris*) include most of our field, bush and pole Beans, of which some are edible-podded and some are not. All are tender to frost, but the bush Beans are both earlier and later than the pole Beans. Culture under glass is unusual with us, but it is coming more into use, especially for starting the early crop. Varieties are very many, and may be used to give a succession. For cultural purposes,

kidney Beans are here divided into dwarf and pole Beans.

(*a*) Dwarf, or Bush Beans.—Hardier and earlier, of short season and requiring no training.

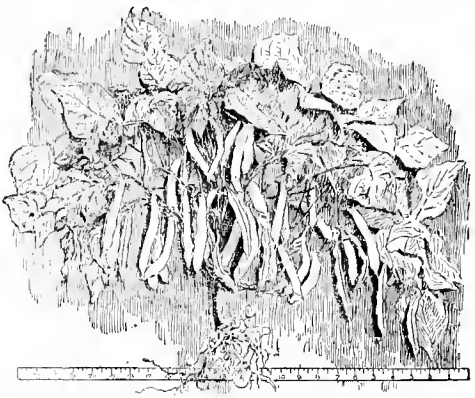

Fig. 15. Whole plant of Dwarf Kidney Bean.

Soil should be light and in good tilth, not recently manured.

Rows should be two feet apart.

Depth, in summer, three inches; in spring, about two inches.

Sow under glass about the middle of April; prick out into pots, and set in the open when frosts are over. Or sow in pots, three to a pot, and thin to one.

Sow outdoors about the second week in May, and be ready to protect against late frosts. Seeds one inch apart. There is no advantage in sowing eye down.

Thin to about four inches, or else to clumps of three or four plants one foot or more apart.

Culture.—Do not touch the plants when wet. A straddle-row cultivator, brushing the tops of a young

Fig. 16. Another type of Dwarf Kidney Bean.

row after a rain or while the dew is on, will practically ruin the crop.

Fertilize as in opening section.

Picking begins according to the kind of Bean, from forty-five days on, the string Beans being earliest. Pick string Beans when they are large enough for use, shell Beans before they dry and harden, but at full size.

Succession.—Bush Beans, especially the string Beans, are long yielders, bearing from six weeks to two months under the best conditions. Successional sowings need not, therefore, be much oftener than three weeks, to come into bearing about the time the older plants begin to yield less. Shell Beans oftener, about every two weeks. The last sowing should be about the first of August; later ones must run the risk of frost.

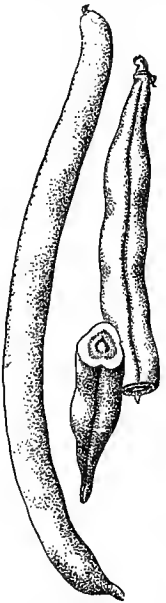

Fig. 17. Pods of Snap or String Bean. The good modern types have no strings.

Protection.—Dwarf beans can be carried through the early light frosts with coverings of cloths.

(*b*) Pole, or Running Beans.—These are later than the bush Beans, and are both more tender to frost and, on account of their method of training, harder to protect. Pole Beans are seldom planted for more than one crop, as their yield is later, and, properly fed and picked clean, they will usually last till frost.

Soil should be warmer than for bush Beans, but not recently manured. A shovelful of good compost in each hill will give the necessary humus.

Distances.—Hills should be four feet or more each way.

Depth, about two inches.

Sow under glass for an early crop

about the same time as bush Beans, and set out three in a hill when frosts are past. Sow in flats and prick out into pots, or three in a pot and thin to one.

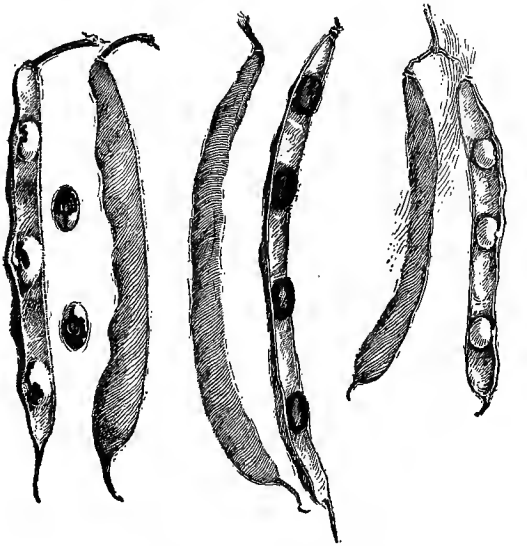

Fig. 18 Types of Shell Bean.

Sow outdoors a week or more later than bush Beans. Plant six or more in a hill, two inches deep, setting the seed eye down.

Thinning.—Thin to three in a hill.

Culture.—Do not brush against the plants or pick when they are wet.

Fertilizer.—A little nitrate of soda or liquid manure

in each hill will help the plant to a quick start. The quantity should be small and not repeated. Apply as soon as the seedlings appear, but not upon them.

Poles or Trellises should be set before the seed is sown. Single poles should be stout and deeply set, trellises according to the ingenuity of the gardener.

Fig. 19. Seedlings of Lima Bean. Two-thirds natural size.

Pick as for bush Beans. With all kind of beans, clean-picking will lengthen the yield.

Row culture for pole Beans is practicable but not usual. See under Scarlet Runner Bean, below.

(3) **Lima Beans.**—Limas (*Phaseolus lunatus*) divide into pole and bush varieties, for the management of which see above, with minor differences as here noted. While the dwarfs are, as usual, earlier than the standards, Limas come slowest to maturity of all our beans, and at the same time are the most affected by our hot, dry summers. Early starting under glass (see above)

ought to assure a crop, even of the large Limas, in our more northern states, in which, however, the small Limas are most advisable. The small Limas are, in fact, almost in a class by themselves.

Limas divide into types as follows: (1) The large true Limas, needing a long season and especially tender to frost. The dwarf of this is Burpee's Bush Lima. (2) The potato Lima, not so late and more hardy. The dwarf is Dreer's Bush Lima. (3) The small Lima, or Sieva bean, earlier and hardier, more resistant to drought, as well as a heavier yielder than the other two. Of all Limas this is the best for our northern states. The dwarf is Henderson's Bush Lima, which is hardier to drought and frost than some of the kidney beans. Limas need special conditions, as follows:

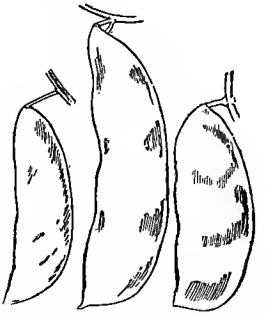

Fig. 20. The three types of Pole Lima Beans. One-third natural size. From the left they are the Sieva, True or Large Lima, Potato Lima.

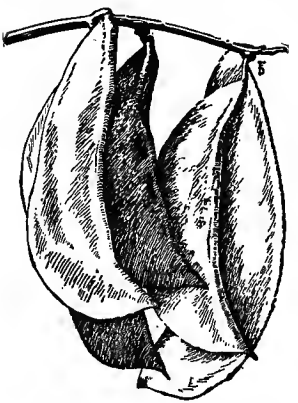

Fig. 21. Pods of the True or Large Lima Bean. One-third natural size.

Soil should be especially sunny and early. Manuring,

if any, should have been done in the previous year. Apply nitrogen for a quick start, but not afterward, and in the hills of the tall varieties put compost, to retain the moisture. Give commercial fertilizers rich in potash and phosphoric acid.

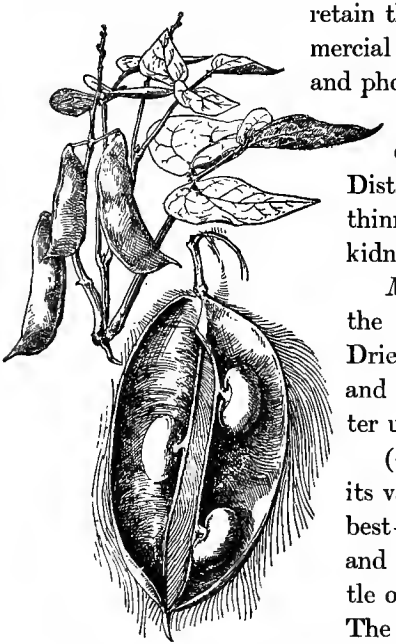

Fig. 22. Henderson's Dwarf Lima Bean. The best Lima for northern culture.

Plant pole Limas eye down, depth two inches. Distances, culture, poles, thinning and picking as for kidney beans, above.

Mulch the dwarfs, to keep the pods from the ground. Dried pods can be picked, and the beans kept for winter use.

(4) The **Dolichos Bean** in its varieties (one a dwarf, the best-known the Asparagus and Yardlong beans) are little offered by our seedsmen. The chief interest in these beans is their very long, edible pods; they are not in any way superior to the common string beans.

Culture is the same as for kidney beans.

(5) The **Soy Bean**, or Soja Bean (*Glycine hispida*), grown chiefly as a forage plant, may be used as a shell

bean, cultivated like the Dwarf Kidney Bean, which see. It is hardy, vigorous, and free of diseases and pests. The beans are cooked when tender, or may be dried and

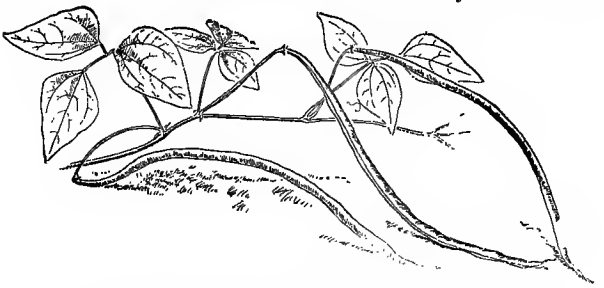

Fig. 23. *Dolichos Sesquipedalis*, or Yardlong Bean.

stored, in which case a long soaking is necessary before cooking.

(6) The **Scarlet Runner Bean** (*Phaseolus multiflorus*) is offered by most of our seedsmen, and its popularity is increasing. A pole bean, it is eaten either with its pods or without; in the former case it is picked quite young, before the seeds have well formed. Its requirements and culture are the same as of pole beans, above. A succession may be maintained by pinching in, topping a few plants to force an early fruiting, and taking the first blossoms from others for a late crop. In England the Scarlet Runner is a popular vegetable, and in its season is preferred to the common string bean.

From roots.—This bean being a perennial, its tuberous roots can be taken up in the fall and kept over winter in sand in a frost-proof cellar. Planted out after

the middle of May, they will give an extra-early crop. Or they may be left in the ground, well mulched, and will bear a mild winter. Plants raised from seed bear a heavier crop, but the roots yield earlier.

Pole culture is like that of kidney beans.

Row culture consists in setting the roots, or sowing the seed, in rows four feet apart. Thin to one foot apart in the row, and train on strong brush, wire, or trellises. Pinch back the ends of the vines.

The roots of the Scarlet Runner are poisonous.

BEET. Beets (*Beta vulgaris*) are biennials, grown as annuals for their tops (as "greens") and for their thickened roots. They are hardy to frost and of easy culture. They divide into classes according to color (red or yellow), but practically as to shape into the old long Beet and the turnip-shaped Beet. The long Beet requires the whole season for its growth; the turnip Beet matures in two months or less. For Chard, which is botanically a Beet, see under its name. Of foliage Beets, usually grown for ornament, some may be used as vegetables. Pests are few; scab is the most serious disease.

Soil should be rich and moderately light for turnip Beets. For the long Beets it should also be deep and not recently manured, and well pulverized.

Distances.—Drills may be as close together as a foot; the seed should be scattered thinly. These seeds

are really fruits, containing several true seeds, so that the Beets come up in little clumps.

Depth.—An inch in spring, two inches in summer when the ground is drier.

Sowing.—Time may be gained by soaking the seed over night. Sow turnip Beets as early as the ground can be worked, and for succession every two weeks up

Fig. 24. Beet seedlings. Natural size.

to the end of July. North of New York City, later plantings will yield greens, but no Beets, unless the fall is late. Further south, planting is possible through August.

Sow the long Beets early in May. As they require about five months in which to mature, successional sowings are not advantageous.

Thinning.—The best of Beets are to be got from two thinnings, the first (when about five inches high) to three inches, the second to six inches. The thinnings are to be eaten as greens; with the second thinnings

there will be young Beets which, when cooked and served with the greens, are delicious.

Transplanting.—Some growers transplant the thinnings, but generally it is not profitable.

Fertilizer.—For turnip Beets, well-rotted manure can be worked into the ground. Commercial fertilizers should be added, rich in potash (20 per cent) and with 6.4 per cent nitrogen. Without manure, use the formula nitrogen 5.8 per cent, phosphoric acid 4.2 per cent, potash 10 per cent. Nitrate of soda, 400 to

Fig. 25. Beets, the long type.

700 pounds per acre, in four applications—one soon after planting, and the others a week apart—has given good results, mainly in earliness.

Storage.—In pits, or in sand in the cellar.

Beets under glass.—Beets can be grown entirely under glass, but it is seldom done. For an especially

early crop, Beets are sometimes started under glass and transplanted, but better results come from starting them in frames, whether hot or cold, and allowing them to mature there.

Diseases.—For leaf diseases, spray with Bordeaux; pick and burn diseased leaves. Avoid scab by not planting Beets after potatoes. Against rot of stored Beets, rotation; remove all spotted leaves.

Pests.—For flea-beetle, white grubs, and cutworms, see under cabbage. For most beetles, use arsenites, with or without Bordeaux. For tarnished plant-bug, leaf-hoppers, or plant-lice, use kerosene emulsion diluted five to ten times. For grasshoppers, set out poisoned baits. For web-worm, underspray with Paris green and lime, mixed as for flea-beetle; fall plowing, which is also a remedy, and the only one, for the leaf-miner. For blister-beetles, see under bean. *If arsenites are used, do not eat the leaves.*

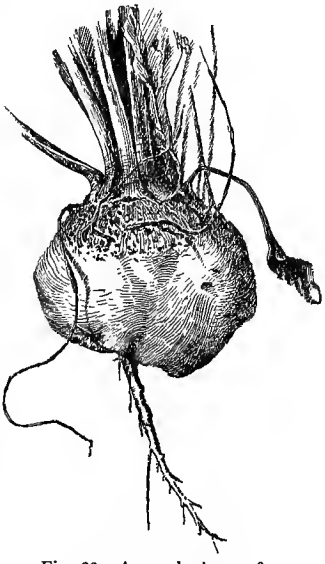

Fig. 26. An early type of the Turnip Beet.

BEET ROOT. See Beet.

BEET, SUGAR. Sugar Beets are seldom used for the table. If they are, they should be picked when young. They are to be treated in every way like Beets, but given more space, the rows should be eighteen inches or more apart; thin to nine to twelve inches in the rows.

BEET.—For Silver, Leaf, Kale, Sea-Kale, Spinach or Asparagus Beet, see Chard.

BENE (*Sesamum orientale*) is a very tender annual plant, seldom grown in the North. Commercially, it yields oil of sesame, used for the skin, or in the East for cooking. In domestic medicine, the leaves are steeped, giving a mucilaginous infusion used for diarrhœa or dysentery, especially of children.

Soil light and quick.

Distances.—Eighteen inches in the row, plants twelve inches apart.

Sow under glass in March or April; prick out, and set in the open when frosts are past.

Culture should be good; water in a drought.

Pick the whole plant in the fall, or the leaves as wanted.

BONESET. See Thoroughwort.

BORAGE (*Borago officinalis*), a very pretty annual, is grown for its young leaves, used in salads and for making claret cup, and occasionally as a pot-herb.

Worth growing for its flowers alone, as a vegetable or herb it has not come into general American use, and is offered by few seedsmen. It has no varieties, and is not troubled by pests or diseases.

Soil should preferably be light, but the plant will thrive in most soils.

Distances.—Rows one foot apart.

Depth.—One-half to one inch.

Sow when frosts are past, usually late in May, where the plants are to stand. Sow earlier in protected seed-bed.

Thin or transplant to nine inches in the rows.

Pick the young leaves only.

Succession.—Sow every three weeks.

BORECOLE. See Kale.

BROCCOLI. A biennial plant (*Brassica oleracea*, var. *botrytis*) closely resembling the cauliflower, but smaller, tenderer to heat, hardier to frost, and not of such fine quality. The American culture of Broccoli is entirely different from the European, where the plants are usually sown in midsummer and wintered over. They will not come well through our severe and changeable northern winters, if indeed they survive at all; but in the milder parts of the country the French or English methods might be practiced. Varieties offered in America are few.

Soil.—Should best be rich, moist, and moderately deep. In a dry soil, work compost or old manure around the plants, or mulch with fresh manure, to retain moisture and give food.

Distances.—Plants should stand two feet apart each way.

Depth.—One inch.

Sow under glass in March, prick out once, and set out when well hardened, at the end of April, giving protection against severe frosts.

Sow outdoors about May 1, either in hills where the plants are to stand (four to six seeds to a hill) or thinly in the seed-bed, drills one foot apart.

Thin hills to one in a hill. Thin seed-bed to about two inches apart.

Transplant when the plants are from four to six inches high. Water in dry weather, and protect against the sun for a day or two.

Culture consists chiefly in conserving soil-moisture.

Fertilizer.—A little nitrate of soda at or soon after transplanting, repeated once, a week later.

Tie the inner leaves over the head as soon as it is formed.

Cut when the head is about four inches in diameter. Broccoli is best when small.

Wintering in mild climates is done either by allowing the plants to stand where they are, or by heeling them in with their heads turned toward the north,

PLATE 111. Standard Brussels Sprouts Plant
With a three-foot scale. Note the compact sprouts

away from the sun. This can be done without entirely uprooting them, by digging the earth away from the roots (taking care not to injure them) on the northerly side, bending them in that direction, and then covering the whole of the stems with earth. The plants will head in the spring. When grown for this purpose, sowings should not be made before June.

Storage of Broccoli is possible, by taking up the plants with as much soil as possible and setting them in a cellar or shed, or in a vacant frame, rather close but not crowding. This keeps them fresher than by hanging them head downward, which is also practiced.

Diseases and pests.—See Cauliflower.

BRUSSELS SPROUTS (*Brassica oleracea*, var. *gemmifera*) are perhaps the most delicate, as they are among the hardiest, of the cabbage family. The plant sends up a leafy stalk, upon which, toward the end of the summer, the sprouts appear in the axils of the leaves. To allow them to develop, the leaves should then be broken off. The sprouts are improved by frost, so that the main crop is grown to mature in late September and October. In mild climates the plants may stand in the field all winter. Varieties are tall, half-dwarf, and dwarf. The dwarf plant bears loose sprouts, closely crowded along the stalk; these are often entered by the aphis, which it is then impossible to dislodge. The taller plant, especially the tall or standard, bears com-

pact sprouts, which the aphis cannot enter, and which are therefore better for the table. As with others of the cabbage family, only the very best seed should be

Fig. 27. A good dwarf plant of Brussels Sprouts.

used, but even then several types of plants are likely to appear from the same package. Besides cabbage pests, the aphis is almost the only insect that attacks the

plant, and this is troublesome only with the dwarf sprouts.

Soil should be a rich loam; in a sandy soil, dig in compost around each plant, or mulch to conserve the moisture.

Distances are according to variety, from two feet by one to three feet by two.

Depth, as below.

Sowing under glass is not necessary except in a late spring, when sow in April and prick out once.

Sow outdoors.—For first crop, to mature in September, sow as soon as the ground is fit, very thinly in a seed-bed, about one-half inch deep. For late crop, sow deeper, about one inch, early in June. Seed-bed rows about one foot apart.

Thin when well up to two inches or more apart.

Transplant early crop in June, late crop about August 1.

Culture.—Keep the patch clean and the surface well broken. When the sprouts begin to show, break off the neighboring leaves.

Fertilize with liquid manure or nitrate of soda at transplanting, and weekly for three or four weeks.

Pick when the sprouts are of sufficient size. They should be cut rather than picked, leaving as much as possible of the heel, for the formation of another sprout. Or top the plant, and in about ten days pull it and cut the sprouts.

Storage.—In severe climates the plants may be taken up with as much soil as possible, when hard freezing is due, and set closely, but without crowding, in a pit, frame, or cellar. Keep the roots moist. South of New York City the plants may usually stand out-of-doors.

Diseases and pests.—See under Cabbage. The root maggot is the worst. For aphis, use kerosene emulsion, tobacco-water, pyrethrum, *before* the sprouts set. *Afterwards*, hot water.

BUCK'S-HORN PLANTAIN (*Plantago Coronopus*), an annual salad-plant, grown for its young leaves. Little known in America.

Soil should be moist.

Sow thinly in rows a foot apart, one-half inch deep, in May. Thin to four inches.

Culture.—Give good culture, and water in a drought.

Pick the young leaves as needed, for mixing in salads.

BURDOCK, EDIBLE, or GOBO (*Lappa edulis*). A Japanese development of the common Burdock, grown for its roots. Vilmorin-Andrieux commend it cautiously, and urge an attempt to develop the Burdock as the beet and carrot have been.

Soil deep, well tilled, and not freshly manured.

Distances.—Rows eighteen inches to two feet apart; thin to nine inches in the rows.

Depth an inch or less.

Sow in spring, and again every month until the first of August for succession.

Dig the roots when young, at about two and one-half to three months. If left longer, the roots become stringy. Cook like salsify.

BURNET (*Poterium sanguisorba*) is a handsome perennial condimental herb, grown for its young leaves, used in salads, and tasting of cucumbers.

Sow in any good garden soil, sandy preferred, rows a foot apart, depth one-half inch, and thin to six inches.

Cut the leaves as required, when the plants are established.

From roots.—The roots can be divided and set out, in spring or autumn.

Protect lightly in severe climates.

CABBAGE (*Brassica oleracea*), one of the most widely grown American vegetables, is grown for its more or less dense and various-shaped heads. Very hardy to frost, it suffers in extreme heat, and should be so planted as to head either before or after midsummer. Cabbage requires a uniform supply of moisture; the heads of plants which stop growth and then start again will orten crack. At the same time Cabbage soils should be well drained, as standing moisture injures the plants.

The times of sowing and of setting out vary with local conditions; usually two crops are raised in the North, one started under glass, one sowed in the open; but a succession may be maintained all summer by several sowings and by choice of varieties. Seedlings raised under glass, and well hardened off, will stand several

Fig. 28. Cabbage seedlings. Two-thirds natural size.

degrees of frost. In the North, cabbage was formerly often fall-sown and wintered over in frames, but this expensive and uncertain method has been superseded by raising under glass in spring. Varieties are many and constantly increasing; they differ in size, shape, season, color, and leaf-texture. The long-season plants are the best keepers. Only the very best seeds should be bought. Diseases and pests, not very numerous, are often troublesome.

For other plants of the Cabbage family, see under their names.

Soil should be deep, rich, moist, well drained, and in good tilth. Cabbage does well on new land. Commercial growers apply manure in great quantities, often one hundred tons to the acre. Chemical fertilizers, used alone, are best in the formula of 7 per cent nitrogen, 8 per cent phosphoric acid, 6 per cent potash. With manure, use potash and phosphoric acid as under Asparagus, Preparing the Permanent Bed.

Distances are according to variety, two feet or more each way.

Depth one-half to one inch.

Sow under glass thirty to forty days before the ground is fit, usually early in March; prick out to

Fig. 29. Cabbage plants of various types. The outer leaves of two plants have been stripped off to show the heads.

four to six inches, at the second or fourth leaf. Keep stocky, and harden off.

Sow outdoors, usually about the middle of April, when heavy frosts are over, according to variety and required time of maturity (varieties mature in from one hundred to almost two hundred days). Sow in seed-bed for a quicker start and better care, in lighter soil; rows one foot apart, seed very thinly in the rows. Or sow in hills where the plants are to stand, two feet or more apart each way, four to six seeds to the hill.

Thin to two inches or more in the rows. In hills, thin to one plant.

Sow for succession early cabbages late, about the middle of June, or even later.

Transplant when the permanent patch is ready; the plants should be three to five inches high. Plants raised under glass and properly hardened will stand light frosts, and can be set out before May 1. Set deeper than before to avoid loosening of the roots by wind.

Culture consists chiefly in keeping the plants growing by maintaining soil-moisture. A mulch of fresh manure around the plants will do this, and will also supply fertilizer.

The plot should be in the best of tilth. Manure and fertilize as above. If cutworms are expected, bait with clover sprayed when standing with Paris green, cut, and spread in little piles; or with bran-mash made with sweetened water and poisoned with arsenites.

PLATE IV. Cabbage in Late Fall

Ready for picking

Subsequent fertilizer.—Experiments go to show that the weight of the crop may be multiplied considerably by nitrate of soda, four hundred pounds per acre, applied in three equal dressings, the first at transplanting, the others at intervals of a month or less.

Fig. 30. Cabbage, the Jersey Wakefield type. An early maturing cabbage.

Pick when of full size, when the heads are hard and before they show signs of cracking. (Cracking or splitting may occur early if the heads stop growing from lack of moisture, and start again.)

In the home garden, if the plants are coming on all together, the maturity of some may be delayed by leaning them toward the north, partly starting them from the ground. When the first heads are cut, leave the stalk with some of the large leaves; the plants will then often put out young heads or sprouts, several to a plant, which may be cut and eaten.

Storage.—Cabbages may be picked with all their leaves, and stored in sheds or cellars; or, pulled with

their roots and earth, they may be set in pits (head down, on their sides, or upright) and covered as freezing weather comes on. Or set them in trenches, well drained, having pulled them and drained all water from the heads. Set close together, roots down and covered with earth. To shed rain, cover with litter, straw or cornstalks, or with a roof of boards, and with earth as the hard frost comes. It is an art to keep them well.

Diseases. – Against club-root (club-foot, finger and toe), keep the plants growing well, keep down weeds

Fig. 31. Cabbage, the Flat Dutch type.

and preserve moisture, dress with lime (air-slaked, seventy-five bushels per acre), destroy diseased plants, and practice rotation. Both in the case of club-root and black rot (or stem rot), manure is suspected as being a cause of the disease. Against black rot late

planting, rotation, burning of affected leaves, and the extermination of insects, are suggested. In storing cabbage, make sure that all diseased leaves are picked.

Pests.—Against cabbage pests generally, keep down all cruciferous weeds, and burn all the rubbish of the patch.

Against cabbage-worms, the best general remedy is

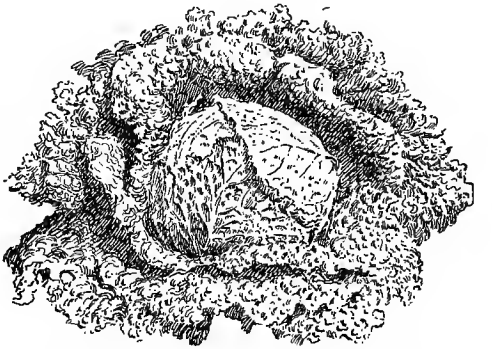

Fig. 32. Savoy Cabbage. Note the crinkled leaves.

the poisoned resin-lime mixture. ("Pulverized resin 5 pounds, concentrated lye 1 pound, fish-oil or any cheap animal-oil except tallow, 1 pint, water 5 gallons. Place oil, resin, and a gallon of water in an iron kettle, and heat until the resin is softened; add lye solution made as for hard soap; stir thoroughly; add remainder of water and boil about two hours, or until the mixture will unite with cold water, making a clear, amber-colored liquid. If it has boiled away too much, add enough

boiling water to make five gallons." New York Bulletin No. 144.) To a gallon of this, in 16 gallons of water, add three gallons of milk of lime, or whitewash, and a quarter pound of Paris green. Spray *by hand*, reaching all parts of the plants and using a strongly made sprayer. Other remedies for the worms are hand-picking, tobacco dust, pyrethrum, hellebore, one ounce arsenical poison in six pounds flour or in ten of air-slaked lime, or some other insect powder applied liberally and often, especially while the plants are young, to destroy the early broods. Spray with water at 160°, kerosene emulsion diluted eight times, arsenites in water.

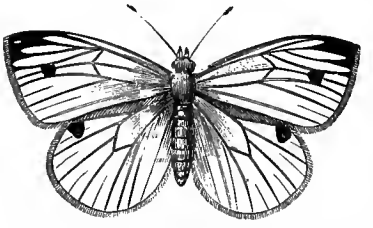

Fig. 33. Female Cabbage Butterfly. When these are seen among the plants, expect the appearance of cabbage worms.

For cabbage-looper, the same remedies.

For the harlequin bug, use blow-torch; place pieces of wood or large leaves about the plants and kill the bugs that collect under them; plant mustard between the Cabbages and spray with pure kerosene. Keep the patch clean, in the fall burn all rubbish, and in the spring make every effort to destroy the first brood. Pick by hand.

Against the troublesome root-maggot, place paper

shields closely about the stems of the plants immediately after setting, and apply muriate of potash or kainit, and nitrate of soda, around but not touching the plants. Or place a tablespoonful of tobacco dust around each plant. Otherwise inject carbon dioxide (one teaspoonful per plant, increase to tablespoonful if the pests are numerous) into the ground beneath the roots, and firm the ground around the plants. Watch for the white eggs laid on the ground near the plants, and pour kerosene emulsion (diluted thirty times) or carbolic acid emulsion (diluted twelve times) or crude carbolic acid (diluted fifty to one-hundred times) around the plants, one-half pint to a plant. Burn plants killed by root-maggot.

If a cutworm has killed a plant, dig for it near by. Protect the rest with baits (see under The Plot) at the base of each plant, and dress around them with kainit, muriate of potash, or nitrate of soda. Paper collars.

Against aphis, use contact poisons, such as kerosene emulsion, tobacco water, pyrethrum, or hot water, applied carefully. Burn refuse leaves and stalks after the heads are taken.

Against thrips, kerosene emulsion, diluted ten times, or whale-oil soap, 1 pound in 4 gallons water. Give the plants nitrate of soda to stimulate growth. (Smith.)

Against flea-beetle, tobacco dust, air-slaked lime, a tablespoonful of Paris Green and a pint of fresh-slaked lime in two gallons of water, four ounces Paris Green to fifty gallons of Bordeaux.

Dig for white grubs near any weakened plant.

"Cabbage snakes" are harmless, either to the plants or to the human body if accidentally eaten.

CABBAGE, CHINESE. See Pe-tsai.

CABBAGE, TURNIP-ROOTED. See Kohlrabi. Also Rutabaga.

CAMOMILE (Chamomile, or Camomilla; *Anthemis nobilis*). A perennial plant, grown in two varieties,—single- (Scotch) and double-flowered (garden or Roman) both hardy. Camomile is grown for its flowers, used in medicine as a tonic, a febrifuge, an emetic, a mouth-wash, and an anodyne. The Scotch Camomile is supposed to have the greater medicinal value, but the Roman produces more blossoms.

Soil should preferably be sandy, sunny, and well drained.

Distances. — Rows one foot apart; plants nine inches in the row.

Depth.—About one inch.

Sow when the ground is warm.

Thin when the plants are four to six inches high.

Set roots at the above distances; water till established.

Gather the flowers when well open. Dry in the shade, and store.

Succession. The plants will grow larger from year to year, and will also seed themselves.

Protect with a light mulch in cold climates.

CAMOMILE, WILD. See Feverfew.

CANTALOUP (Cantaloupe, cantaleup, canteloup, canteloupe). See Muskmelon.

CAPSICUM. See Pepper.

CARAWAY (*Carum Carui*). A biennial, or sometimes annual plant, grown chiefly for its seeds; used in cooking. The root is sometimes eaten, and sometimes the leaves and stems. No varieties.

Sow when frosts are past in any good soil, thickly in drills a foot apart and one inch deep. Thin to nine inches when well up. Protect in the North. The plant will bear seed the second summer. Gather when ripe. Or sow seed as soon as ripe, protect over winter, and gather early the next summer.

CARDOON (*Cynara cardunculus*). A perennial plant, allied to the globe-artichoke and thistle, but tender to frost and usually grown as an annual. Its edible parts are the midribs of its tall leaves, which are tied together and blanched; the roots also are occasionally eaten. For best results, growth should never be

checked. Some little skill in blanching is required, and when properly blanched the plant should be cut at once, as it soon rots. An early sowing of Cardoon may be made in pots under glass, but the general practice is to make but a single sowing out of doors. Cardoon is not offered by all American seedsmen; varieties are prickly and spineless. No diseases or pests are reported.

Soil should be moist, rich, and deep. A good celery soil will suit Cardoon. Work compost or well-rotted manure into the hill if possible, especially on sandy soil.

Distances. – Rows four feet apart, or hills three by three feet.

Depth.—One-half to one inch.

Sow under glass in April, in four-inch pots, five to six seeds to the pot; thin to one plant and harden off before setting out. Sow in the open ground when frosts are past, late in May. Pots over the hills will assist the germination. Sow very thinly in the rows, three to five seeds in the hills.

Thin when well up, to two feet or more in the rows, one plant in the hills.

Set out when frosts are past.

Sowing in seed-beds may be practiced with Cardoon, if the transplanting is carefully done and the plants not checked. Rows one foot apart. Thin plants to four inches.

Transplant from seed-bed with care, taking earth with each plant, when about four inches high.

Culture.—Preserve the soil moisture by cultivation; water in a drought.

Fertilize with a general fertilizer, rich in nitrogen, under the seeds in the row or hill; nitrate of soda or liquid manure, after the plants are well up, in small quantities every ten days.

Blanching.—When the large outer leaves are eighteen inches or more tall, usually late in the season, gather the whole plant together *when dry*, and tie the leaves at the tip. Wrap with matting or heavy paper, pack straw or hay around them, and pack earth firmly over the whole, leaving the tips of the leaves still exposed. The plant should be blanched in two weeks or more, and when white and tender should be cut at once, before it rots. The root may also be pulled and eaten. Cardoon should not be allowed to grow too rank and tall, as thorough blanching is difficult. Blanching on a small scale may be done by means of drain-pipes set over the plants after tying.

The row culture has the advantage over hill culture that the plants may be ridged up like celery, with less labor, and will stand frost better. Cardoon may be taken up and blanched in trenches, or indoors, if it comes late to blanching size.

Winter protection for roots is possible in very equable and mild sections of the country. It is better, however, to eat the thicker parts of the roots, and raise the plants again from seed.

Blanching in storage is practiced with late-maturing plants which might be injured by frost. Having tied them up and partly covered them, as soon as blanching has begun take up the plants with balls of earth, and store close together in a dark cellar, where they will complete their blanching, and will last longer than if blanched out-of-doors.

CARROT (*Daucus Carota*). A biennial plant grown as an annual, and cultivated for its roots. The virtues of the Carrot, especially of the improved varieties, are not

Fig. 34. Carrot seedlings. Natural size.

generally appreciated; but the short varieties are now widely grown in the East, and in England and France the Carrot is so popular that it is forced under glass. It is very hardy to frost. Varieties are short (early), half-long (medium season) and long (late). The short,

blunt varieties are often annual plants, the roots not keeping well when out of the ground; they are used for forcing and for early and late outdoor sowings. The long, pointed, coarse varieties are now used chiefly for stock. Pests and diseases, reported troublesome abroad, are as yet insignificant with us.

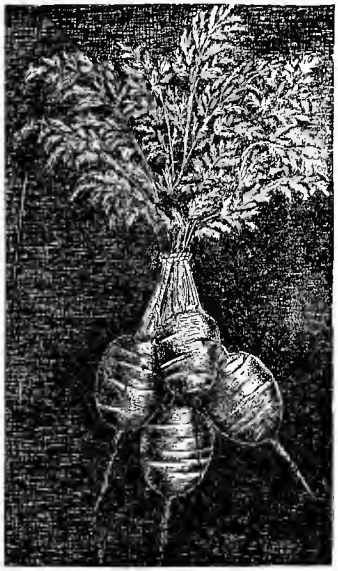

Fig. 35. Short Carrots, used for the early and late crops.

Soil should be rich, light, not given to baking, and in good tilth. The soil should not have been recently manured except for the short varieties.

Distances. — Rows twelve to eighteen inches apart, according to variety.

Depth.—One inch or less.

Sow, for earliest crop, the short varieties as soon as the ground is fit; for succession, the long and half-long varieties soon after, early in May. June sowings of the half-long varieties may be followed by July sowings of the early kinds; these will not keep well, but the others may be stored for winter. Sow

always thickly, as germination is uncertain, although a good stand makes hard thinning.

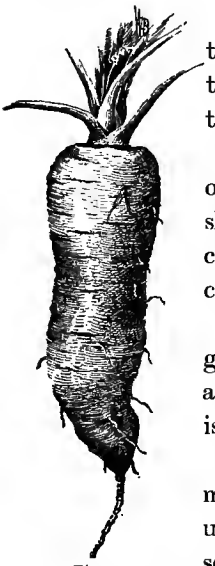

Fig. 36.
Half-long Carrot.

Thin, when the plants are well up, to three inches. As the large varieties grow they may be thinned again to six inches, and the thinnings eaten.

Culture.—Do not let the soil bake over the seeds, which germinate slowly. The seedlings are delicate; cultivate very carefully until the tops cover the ground.

Fertilizer.—The formula of nitrogen 4 per cent, phosphoric acid (available) 5 per cent, potash 10 per cent, is recommended by Voorhees.

Succession.—A constant succession may be maintained from late June until spring by choice of varieties and season of sowing, storing the winter Carrots. In mild climates Carrots are sometimes sown in August and wintered in the ground for a spring growth and early picking. In general, however, Carrots will not survive a winter of any severity.

Storage.—The late varieties may be stored in pits or in sand in the cellar.

Force the early varieties under glass, the temperature from 50 to 60 degrees.

CASTOR-OIL PLANT (*Ricinus communis*), is a plant seldom grown otherwise than commercially, or else for bedding purposes. Castor-oil is expressed from its seed, the castor-bean.

Sow when frosts are past in any good soil; or start under glass in March or April and set out.

Distances.—Three by three feet.

The plant is a half-hardy annual. Take the seeds when ripe.

CATMINT. See Catnip.

CATNIP or Catmint (*Nepeta Cataria*) is a perennial herb grown for its leaves and tender stems, used in seasoning. No varieties.

Sow in ordinary garden soil, when hard frosts are past, thinly, in drills 18 inches or more apart.

Depth one inch.

Thin to six inches.

Pick the leaves and shoots when the plants are well established. The whole plant, when in blossom, may be cut down and dried.

Renew from seed when the plants show signs of decline.

CAULIFLOWER (*Brassica oleracea*, var. *botrytis*). A member of the very various cabbage family, probably developed from the broccoli, and grown for its flower-

stems, which form the thick white "head" of the plant. Cauliflower is difficult to grow, a "fastidious vegetable," "one of those crops in the culture of which the unskilled amateur is liable to stumble upon success, and the more experienced professional to meet with failure." (Greiner, in Cyclopedia of American Horticulture.) Proper soil, a favorable summer (the element of chance), careful cultivation, extermination of pests, and good seed, should give success with Cauliflower. The crop grows well in certain localities (the eastern coast, near Puget Sound, and near the Great Lakes), where it gets the conditions of moist and cool air which it requires. Elsewhere great pains are taken to grow Cauliflower in two crops, one maturing before, and the other heading after the heat of midsummer. For these there is also a choice of varieties, the earlier being best for the first crop. Well handled, even the seedlings of Cauliflower are fairly hardy, while the mature plants will stand severe frosts. The plant, like the cabbage, should be kept growing by means of a constant supply of moisture, or the head will "button," or "bolt." When the heads have formed, the leaves should be tied together over them to keep off the sun or rain. Breaking the leaves down over the head is not thoroughly effective. It is essential to good Cauliflower culture that the cabbage-worms be kept from the plant, or their excreta will ruin the head, however perfect it may otherwise be. Seed for the Cauliflower should be of the very best. Since an

ounce will give two thousand five hundred or more plants, five dollars an ounce is not really expensive. As with cabbage, the old method of fall sowing and wintering the plants in frames is giving way to the method of starting the plants in spring under glass. Varieties are practically two,—early (dwarf) and late. Diseases and pests are sometimes very troublesome.

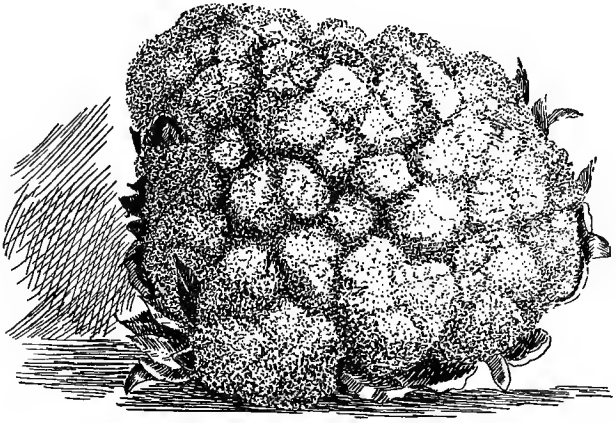

Fig. 37. Cauliflower head, the leaves trimmed off.

Soil should be especially rich, moist but well drained. Almost any quantity of manure (horse manure preferred) may be worked into the soil, and should be supplemented with potash and phosphoric acid. Before setting out put the soil into fine tilth, and keep it so. Bait against cutworms before setting out, as with cabbage.

Distances.—Rows two to two and one-half feet apart, according to variety. Plants in the row eighteen to twenty-four inches. Or set out or sow in hills, twenty-four to thirty inches each way.

Depth one inch in spring, two inches later.

Early crop. — Usually from the dwarf or early varieties. Start under glass in early March, or thirty to forty days before the ground will be fit, and prick out once. Keep the plants stocky, but do not stunt, and harden off. Set out when the ground is in the best condition; the plants will need no protection against light frosts. Give nitrate of soda or liquid manure to start them off well.

Second crop.—Sow outdoors, in a seed-bed for a quicker start and better care, in drills a foot apart, as soon as the ground is fit. This crop is usually of the large kinds. Sow very thinly, and thin to two inches apart, transplanting the thinnings if necessary. Or sow in hills thirty inches each way, several seeds to a hill, and thin to one. Transplant from seed-bed at about five inches, and give nitrate of soda or liquid manure.

Besides these two crops, it is possible to get a late crop of early varieties by sowing in early June.

Culture consists in clean hoeing and surface mulching, either with dirt, or, best, with manure.

Fertilizer.—Dress with nitrate of soda once or twice soon after transplanting.

Tying.—When the heads have formed enough to

begin to push aside the small leaves, tie the larger leaves together over the centers, leaving a few still loose. This is to exclude rain and sun. It will not keep worms out: these should previously have been exterminated, or they will ruin the heads with their droppings.

Cut the heads at full size.

Diseases are the same as with cabbage, which see.

Pests are also much the same as with cabbage. Plant-lice may be fought by insect powders, kerosene emulsion, hot suds, or tobacco in solution. The root-maggot is especially injurious to Cauliflower; treat as with cabbage. As said, worms should be exterminated before the plants head; if the poisoned resin-lime mixture is used, apply once soon after setting, and once *before the heads begin to thrust aside the inner leaves.* The poison should not reach the head.

CELERIAC, or Turnip-rooted Celery (*Apium graveolens*, var. *rapaceum*) is a vegetable of the celery family grown for its enlarged root, which when raw or boiled is used in salads and for flavoring, or is cooked as a vegetable. With a celery flavor, and keeping well, it should be better known in America, where it is in demand chiefly among the German population. It is grown like celery without the earthing-up (although some growers earth the roots, a simple process) and is placed at less distances. As with celery, transplanting is necessary to success. Celeriac is not offered in America in

any considerable variety; the kinds vary somewhat in the size and shape of the root.

Soil should be, as for celery, deep, moist, and rich; if possible, it should have been well manured.

Fig. 38. Celeriac. The root is the edible part, and tastes of celery.

Distances.— Rows eighteen inches to two feet apart, according to variety; plants in the row, nine inches apart.

Depth.— Barely cover the seed, or press it into the ground and sift earth over it lightly.

Sow early crop under glass in early March, and prick out once. Harden off and set out-of-doors when the ground is fit and severe frosts not expected. Give a dressing of nitrogen at this transplanting.

Sow late crop in the seed-bed when the ground is fit, in drills apart as convenient. Sow thinly, barely cover, and keep the ground moist, preferably by shading, until the plants show.

Transplant or thin at three inches to three inches apart in the rows. At eight inches or more transplant to the above distances, taking care to destroy the tap-root if that is not already done at the first transplanting.

Fertilize with nitrate of soda or liquid manure, lightly, after each transplanting, and a few times thereafter, ten days apart.

Culture.—When the knob-roots are well formed, trim off the suckers and side roots a few times. Keep the earth from the heart of the plant in cultivating.

Earthing around the root in the fall will whiten it.

Protection.—With slight protection the plants may be kept in the ground until early winter.

Storage.—They may be pulled and the roots stored in sand in the cellar.

Diseases and pests are not troublesome.

CELERY (*Apium graveolens*) is grown chiefly for its blanched stalks. The thick part of the root is sometimes used like celeriac, and the tops are used in flavoring or are cooked as a vegetable. Celery at its best is one of the finest vegetable delicacies, requiring for its culture, as has been said, only "a very little very great care." Given rich soil, constant moisture, with careful handling at the right times, and results are almost sure to be right. Celery should always be transplanted, once in any case (to destroy the tap-root) and twice if possible. Home gardeners should always raise their own

plants, to make sure of their quality and to save exposure in transportation. The plant is very hardy, and can stand outdoors very late. Celery is invariably blanched, but the blanching is very differently done, according to the season and to the grower's equipment

Fig. 39. Celery seedlings. Natural size.

and space. Seed should always be of the very best; American-grown seed sometimes gives pithy stalks. Varieties are many, and classify chiefly as to height, color (red tint), and "self-blanching" properties; there is also a Soup Celery, grown entirely for seasoning. Insects are seldom troublesome, diseases occasionally so.

Soil should be deep, rich, moist, and in good tilth. Work in manure (ten or fifteen tons per acre) with high-grade commercial fertilizer (six to eight hundred pounds per acre). Commercially, Celery is often grown on bottom-lands, where moisture is certain, and the plants grow very large; but upland-grown Celery is finer

in quality. Celery will grow in any good garden soil, but sandy soils should be heavily dressed with manure.

Distances are according to size of varieties and methods of blanching.

Sow early crop under glass in February, and cover till the plants appear. Seed should be merely pressed into the soil. Prick out once or twice (cut off tap-root at first transplanting) and keep the plants stocky, if possible without cutting back. Set in the field when the ground is fit, after well hardening off.

Sow late crop in a moist seed-bed when the ground is fit. Drills apart as convenient, seed thickly, one-fourth inch deep. Or sow broadcast in the seed-bed and sift earth over the seed. Keep the ground from baking or drying.

Treatment of young plants in the seed-bed is entirely according to the scale on which they are raised and the labor which can be devoted to them. Commercially, they are usually thinned to three inches or so apart, and kept stocky by cutting off the tops. Wherever possible (in garden culture) the seed-bed plants should first be thinned to about an inch between the plants, and these transplanted once or twice when large enough to handle, taking pains at the first transplanting to destroy the tap-root; the second transplanting should follow the first at no great interval, as soon as the plants are again established. Give light dressings of nitrate of soda or liquid manure. Always keep the

earth from the heart of the plant, and the fertilizer away from the tops.

Digging trenches for the final setting, and putting manure in the bottom of these, is now not widely practiced in this country, though the method is excellent wherever it can be afforded. Modern culture sets the plants upon the level ground, taking pains first to make it rich. If set in trenches, these should be well drained, and the plants set on little ridges along the middle, or their hearts will be filled with silt at each heavy rain.

Fig. 40. A good plant of Celery, trimmed.

Fertilizer for Celery, when specially mixed, should be rich in nitrogen and potash. Experiments have shown that nitrate of soda at the rate of four hundred pounds per acre, applied in three equal dressings after the final

setting of the plants, gives great benefit, "equivalent to a gain of $54.01 for every $1 invested in the nitrate of soda." (Farmers' Bulletin No. 162.) The New Jersey station recommends two equal dressings three or four weeks apart. Or divide the four hundred pounds into five or six doses in a rainy summer.

Methods of blanching are chiefly four:

(1) *Blanching with Boards.* — This is the best method for the summer crop, as earthing is likely to cause rot in summer. Boards are of pine or hemlock, spruce or cypress, one inch thick, one foot wide, twelve feet or more long, dressed on both sides. These are set against the rows of plants, leaning them slightly inward; the boards are held in place by stakes, or by securing the tops together by nailed cleats or bent wire. Set the boards when the plants will show but a few leaves above them. The plants shoot up for the light, then fill the space between the boards, and exclude air and moisture. Set boards only when the plants are dry. Blanching will be completed in two weeks or more. For this method, set the rows two to three feet apart, plants, six inches or more in the rows.

(2) *Earthing.*—The best autumn method, giving the best quality of Celery and protecting against frost. Earth only when the plants are dry, and do not begin until the hearts of the plants are four inches or more above the ground, so that the stalks protect the center of the plant from the earth.

The first earthing is chiefly to begin the upright growth. Hold the spreading leaves together with one hand and bank the earth around the base of the plant with the other; or tie the whole row at a time with one piece of string (or best with "paper twine") by passing it in and out between the plants, securing only

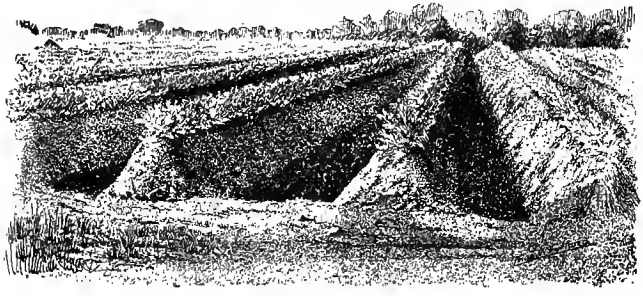

Fig. 41. Celery rows earthed up for blanching. The last earthing.

to the end plants. Then earth up by hand or by plow.

Later earthings, of which there are two or even three, are made as the plants shoot up. Never get the earth higher than the heart of the plant, or it will wash into it and spoil it.

For this method, plants are set in rows four feet or more apart; or sometimes two rows are set a foot apart (four feet between the double rows) and both earthed up together; plants six inches or more apart in the row.

(3) *The "New method" of blanching* consists in setting the plants in a bed, six inches or more each way according to variety, with boards set at the edges when the plants are tall enough. The plants, as they grow, keep the light from their stalks and blanch themselves. For this purpose the soil must be especially

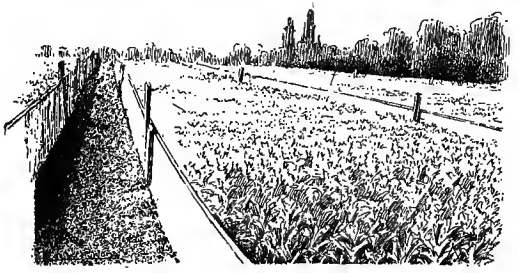

Fig. 42. The "New Culture" of Celery. The plants are set closely together and the patches edged with boards. By this method Celery blanches itself.

rich and moisture plentiful; irrigation is usually necessary. The so-called self-blanching varieties are best for this method.

(4) *Blanching in storage* is for winter Celery, which, if thoroughly blanched when taken from the field, will sometimes rot in storage. For this method the rows are not set more than two feet six inches apart, and earthed up once, to secure upright growth and to start the blanching. At the approach of winter the plants are taken up, the roots trimmed and then packed closely together in pits, sheds or boxes in the

cellar; there they will complete their blanching. If tied when earthed, they can be more conveniently handled.

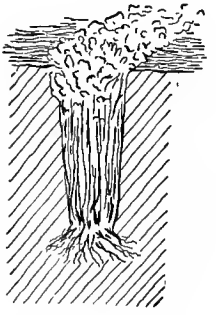

Fig. 43.
Celery plants set in a trench for early winter storage.

Other methods of blanching, on a small scale or for exhibition, consist chiefly in tying the plants in an upright position with soft cord, worsted or "paper twine," and wrapping with paper or covering with drain-tiles. These plants are often earthed as well, especially in cold weather.

Storage.—Methods are as numerous as for blanching, in pits or in empty coldframes, in trenches, or in the rows as earthed up, covered with matting, straw, boards, tar-paper, or glass, to exclude frost and moisture. Houses are often specially built. For home storage, the following method is probably the best on a small scale. In a box somewhat deeper than the plants, put two or three inches of sand, soil, or coal ashes. Take up the plants, trimming the masses of roots to small cubes with the spade, and pack them closely in the box. Set in a cool cellar, with little light, and occasionally water the plants by means of a funnel or long pipe, or through holes bored in the sides of the box above the roots, taking care not to wet the leaves. The plants will complete their blanching, and, if the

room is not too warm or moist, will keep for a number of months.

Diseases.—Against leaf-blight, spray with Bordeaux when the plants are young; later with a weak solution of ammoniacal copper carbonate every two weeks. For leaf-spot, use healthy seed on healthy land and spray early and regularly with Bordeaux. Against storage diseases, store in a dry place.

Pests are seldom bothersome. For the lettuce- and other worms and for the celery-caterpillar, use insect

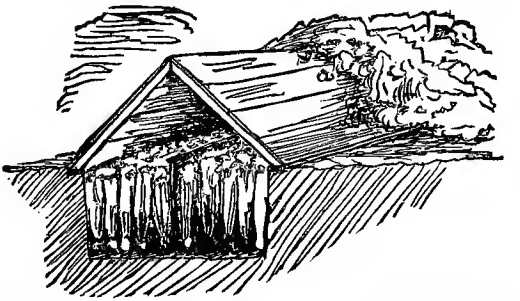

Fig. 44. Celery stored for winter in a pit. The pit is roofed with boards to keep out rain, and covered with hay against the cold.

powders when the dew is on. Hellebore and pyrethrum are the safest to use.

For flea-beetles, Bordeaux; tobacco in powder or decoction. For the two tortrixes, pyrethrum and water, sprayed forcibly. For aphis, kerosene emulsion or tobacco water. For the little negro-bug, carbolic acid, a teaspoonful to two gallons of water, carbolic

acid emulsion of the same relative strength, or a teaspoonful of carbolic acid to one bushel of lime, dusted on. For Celery borer, hand picking. For thrips, see Onion.

CELERY, KNOB or TURNIP-ROOTED. See Celeriac.

CHAMOMILE. See Camomile.

CHARD (*Beta vulgaris or B. Cycla*), variously known in its varieties as Swiss Chard, Silver Beet, Leaf Beet, Kale or Sea-kale Beet, Swiss Beet, Spinach Beet, and Asparagus Beet, is a vegetable little known in this country, and, though sometimes found in the markets, not offered by all our seedsmen. Yet it deserves to be better known, on account of its productiveness, quick growth, and simple culture, as well as for its capacity of yielding a double crop, in two senses. It bears a thick, broad leaf upon a fleshy stalk; when picked, the leaves may be served as spinach, the stalks or midribs of the leaves as Chards (see under Artichoke). The plants can be stripped of all but their small leaves and will bear again, or the large leaves may be picked through an extended season. The plants grow quickly; thinnings may be transplanted. Although the plant is of the beet family, its root is inconsiderable as food. Chard is very hardy and will stand severe frosts. Varieties are several (ac-

PLATE V. Chard, after Repeated Pickings

The plant was sown April 27, photographed October 6, and was cropped all summer

cording to color and to the size of the stalks, which varies considerably) but are little offered in America. No serious pests or diseases.

Soil.— Any moderately rich garden soil, not too wet.

Distances. — Rows eighteen to twenty-one inches, or, if the plants are to be allowed to grow individually to their full size, two feet apart.

Depth, an inch or less.

Sow as early as the ground can be worked, and for succession every three or four weeks.

Thin at first to three inches in the rows. Thinnings may be transplanted.

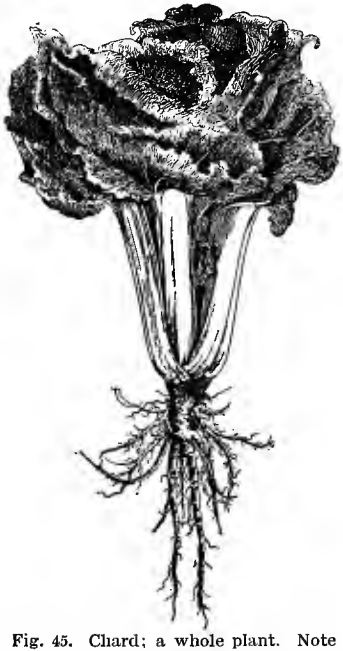

Fig. 45. Chard; a whole plant. Note the white leaf-stalks, which, as well as the leaves, are used for the table.

Fertilizer.—Nitrate of soda or liquid manure, applied at intervals throughout the season.

Management.—A row of Chard is best managed as follows: Thin when the plants are about six inches tall, to three inches apart in the rows, the thinnings to be

eaten, leaves and ribs together. Thin again to six inches, and again to a foot or more. When the ribs or stalks are large enough, they may be used separately from the leaves. When the plants stand a foot to eighteen inches apart in the rows, pull the leaves as needed, or strip from the plants all but the interior head, leaving that to grow again. In this way the plants will yield for a considerable time. The varieties of which the midribs are small may be managed in much the same manner, serving leaf and stalk together, and not thinning to more than a foot.

Forcing.—Chard may be raised under glass; or the plants may be covered in the open as winter approaches, and will give repeated pickings. Lifted with balls of earth and taken into a greenhouse or put into a mild hotbed, they will yield for a long time.

CHERRY, BLADDER, GROUND or WINTER. See Tomato, Strawberry.

CHERVIL. There are two plants of the name (for Sweet-scented Chervil, see Sweet Cicely).

(1) **Salad or Leaf Chervil** (*Scandix cerefolium*). An annual plant grown for its leaves, used in salads and garnishing. It is much esteemed in Europe, especially by the French, and is the chief ingredient of *fines herbes.* It is very hardy to frost, but tender to heat; in our climate it needs a cool location, or it will soon run to

seed. There are two varieties, the plain and the curled; Vilmorin-Andrieux points out that the latter, being unmistakable, cannot be used instead of the poisonous plants of its family, the Umbelliferæ. No serious diseases or pests are reported.

Soil.—Any good soil, but preferably cool and moist. In summer should have shade or a northern aspect.

Distances.—Rows a foot or more apart; plants eight to ten inches in the row.

Depth.—Shallow,—about one-fourth inch.

Sow as soon as the ground can be worked.

Thin, early to eight or ten inches in the row.

Pick when the leaves are full grown. Several cuttings are possible from the plant, through the season. Mature in six to eight weeks.

Successional sowing in late summer, for fall use, will be necessary where summers are hot.

Protection.—The plants can be wintered in a cold-frame, and the leaves picked through a mild winter. In the open they will live through under a light covering, except where winters are severe.

(2) **Turnip-rooted Chervil** (Bulbous-rooted or Tuberous Chervil; *Chærophyllum bulbosum*) is a biennial or plur-annual plant, grown for its tuberous roots, which are used like carrot, although gray in color, and sweeter. It is of difficult management, the seeds being of short germinating power, and germinating slowly, if at all, when kept dry over winter. The roots mature

usually in July, when the foliage begins to die, but the tubers improve by remaining in the ground.

Soil moist.

Distances.—Rows twelve inches apart.

Depth, about one-half inch.

Sow.—It is best to stratify the seeds over winter; they will start soon after sowing in the spring, when ground is fit. Otherwise sow as soon as ripe, or in the fall; fall-sown seed will sometimes wait a year before sprouting.

Thin to six inches in the rows.

Harvest late in the fall.

Store in sand in the cellar, away from frost.

CHICORY, Succory, or Wild Endive (see Endive), *Chicorium Intybus*, is a plant of somewhat varied uses, well known in Europe, but not yet known in America in all its possibilities. Commercially, the large-rooted varieties are now cultivated in America for the roots, used as a substitute for and adulterant of coffee. In the garden, Chicory may be grown as a root or a salad crop, its roots being best when young and its leaves when blanched or forced. The roots are cooked like carrot; the leaves are cut up for salads or boiled like Brussels sprouts. The roots are hardy and will live over winter, producing a new crop of leaves in the spring, after which they will be of little value. Vilmorin-Andrieux gives six varieties; American seeds-

men, when they have the seeds at all, seldom offer more than three kinds. Enemies of Chicory are not troublesome.

The plant is cultivated according to the results desired. Grown for the leaves without blanching or forcing, the roots are allowed to remain a few inches apart in the row, and the leaves cut when six to eight

Fig. 46. Seedlings of Chicory. Two-thirds natural size

inches long, several times in the season. They are bitter, like dandelion, and are best cooked in two waters. The especial delicacies from Chicory are, however, the Blanched Chicory, the Barbe de Capucin, and the Witloof, all of which can be grown from any variety according to the system of management, although for the last two the larger varieties are best. These are the Large-rooted (Brunswick or Magdeburg), which is the Chicory of commerce, and the Witloof or Brussels.

Soil.—If not raised for forcing, any good garden

soil will do. For forcing or for the roots, Chicory grows best in a deep loam, in good tilth, not rich in nitrogen or recently manured, and with an open subsoil. Commercially, "it may be said to thrive upon all stone-free soils that will produce paying staple crops, except clays (too hard), lightest sands (too dry) and mucks (too rich in nitrogen and too sour)." (Cyclopedia of American Horticulture.)

Distances.—Rows fifteen inches to two feet.

Depth.—About one inch.

Sow as soon as the ground can be worked. Sow thickly for green leaves or outdoor blanching; thinly, for the roots or for forcing.

Thin to two to three inches in the row for leaves, six to eight inches for roots or for forcing.

Culture as for carrots or salsify.

Fertilizer.—As for root crops: little nitrogen, good amounts of phosphoric acid and potash. Commercially, should not follow clover, but if the plants are grown for the leaves, nitrogen may be given.

Cut the leaves when young, six to eight inches long, and as often as they grow again. After the last fall cutting, the roots may be left in the ground over winter for a spring cutting.

Blanching out-of-doors is the same as for endive,—by pots, boards, or by earthing up. The leaves are, for this purpose, allowed to grow to a foot or more in length before cutting off the light. They are more

tender and less bitter when blanched than when green.

Roots for the table should be taken up when small, four to six inches long.

For forcing, the plants are allowed to grow all summer, without cutting the tops; in the fall the roots should be from an inch to two inches in diameter in the Witloof, larger in the Magdeburg. Products of forcing are the Barbe de Capucin and Witloof.

(1) **Barbe de Capucin.** Until quite recently this was grown even in France from the common Chicory; of late years the larger varieties have been used with success, when not full grown. Take up the roots as they come, without trimming or shortening, cutting only the tops to within an inch of the crown. Lay them in sand in tiers, in boxes or the floor or bench, the crowns showing for about an inch; the heap when formed will have a backward-sloping face; earth may be used instead of sand. Moisten, and cover from the light, leaving room for the leaves to grow. The temperature of an ordinary cellar will do, best at 55° to 60°. In about twenty days, loose blanched leaves may be cut, and often a second and third crop. A succession may be kept up through the winter.

(2) **Witloof** is best grown from the Witloof or Brussels Chicory, though the Magdeburg will serve. Take up the roots in the fall, discarding all with more than one crown, or with very narrow or divided leaves. Trim to a uniform length of eight to ten inches. Out-

of-door forcing may be done in a trench, setting the roots upright one and one-half to two inches apart, eight inches below the surface, and covering with light soil; then heap with warm manure to a depth of from eighteen inches to two feet. In about a month the Witloof, like a close head of Cos lettuce, will be formed.

But forcing is best done indoors, under a greenhouse bench, or in a warm cellar, the roots plunged in soil or tanbark up to their crowns, and covered with about two feet of manure; in this way a quicker result is secured. When the Witloof is cut, if the roots are left in place, smaller leaves, loose like the Barbe de Capucin, will be produced for a second crop.

CHINESE PRESERVING MELON. See Watermelon.

CHIVE or Chives. See Cive.

CHUFA, or Rush-Nut (*Cyperus rotundus* or *C. esculentus*), is a species of sedge, whose tuberous roots, or "nuts," less than an inch long, are much liked in the South, and in the south of Europe, when eaten baked or raw. The flavor is sweet; the nuts are sometimes ground to make a kind of coffee. The plant is little grown in the North, where it does not mature well.

Soil.—Moist.

Distances.—Rows a foot or more apart.

Depth.—Tubers, one to two inches, root divisions as before. Set six inches apart in the rows.

Dig in the fall, and store from frost. The nuts become sweeter as they dry.

CIBOULE. See Onion, Welsh.

CITRON. See Watermelon.

CIVE, Chive or Chives, or Chive-garlic (*Allium Schœnoprasum*) is a plant of the onion family, perennial and hardy. It is grown for its leaves, which have a mild onion flavor and are used in seasoning. They may be cut throughout the season. No varieties, diseases or pests. Propagated by seed or roots.

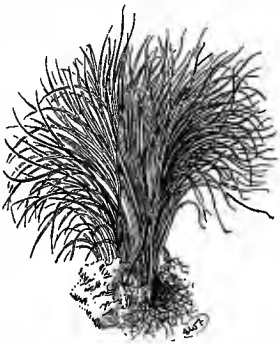

Fig. 47. A clump of Cive.

Soil.—Any good garden soil.

Distances.—Rows a foot or more apart, plants six inches or a foot in the row. The roots of Cive, however, rapidly multiply into clumps, so that it is best grown in solid rows if in any quantity, and is often used for an edging, where its small violet sterile flowers are handsome.

Depth of seed, one-half inch. Of roots, the same as before.

Sow when the ground is fit; set out roots in April.

Thin seedlings to six inches in the rows; thinnings can be transplanted.

Cut the leaves (when the plants are well established) as wanted throughout the season.

Protection is scarcely needed except in very cold winters.

Reset the roots, by taking up and dividing, every three or four years.

Winter the plants in boxes in the house, for use as needed.

CLARY (*Salvia sclarea*) is an herb now little known, grown for its leaves, used in seasoning, especially of soups. It is a perennial, but best cultivated as an annual or biennial.

Soil.—Any good garden soil.

Distances.—Rows fifteen to eighteen inches.

Depth, about one inch.

Sow thinly, where the plants are to stand or in a seed-bed when the ground is warm.

Thin to fifteen to eighteen inches, or *transplant* from the seed-bed to the above distances, when two to three inches tall.

Culture.—Preserve surface mulch, or mulch with manure.

Pick the leaves when the plant is well established, usually in midsummer, and at intervals until the plant goes to seed, which is usually in the second summer. After seeding, the plant is of less value.

Protection.—Cover with straw or litter.

Renew from seed, or by cuttings taken in spring; shade the cuttings and water till they start.

COLEWORT. The cabbage or allied plants when grown as a pot-herb and cut for use when young, before heading.

Fig. 48. A plant of Collards.

COLLARDS. A form of kale, grown chiefly in the South, where the cabbage will not head, and not particularly prized in the North where true cabbages can

be grown. A seed-bed crop. Best known variety is the Georgia Collard. The word Collard is also used for young cabbages, planted thickly in rows and picked when young for use as greens.

Soil.—Rich and moist.

Distances, three to four by three feet when set out. Rows in the seed-bed a foot or more apart, as convenient.

Depth, about an inch.

Sow in the North in July or early August.

Thin in the seed-bed when well up, to three or four inches apart.

Transplant at six inches or more.

Fertilizer as for cabbage.

Pick the leaves as wanted.

Disease and pests are those common to the cabbage tribe. See Cabbage.

Succession.—Sow fortnightly.

CORIANDER (*Coriandrum sativum*), an annual herb grown for its seeds, used in confectionery and in the manufacture of liqueurs, as well as for seasoning in cooking. A hardy plant, easily grown, except as noted below.

Soil.—Any good garden soil, but a light, warm loam is best. Yet on some soils Coriander will not produce seed.

Distances.—Rows eighteen inches apart, plants one foot or more in the row.

Depth, about one inch.

Sow in fall or early spring.

Culture.—Give ordinary culture.

Pick the seeds when ripe; or pick whole plant and let it dry on a sheet, on which shake out the seeds.

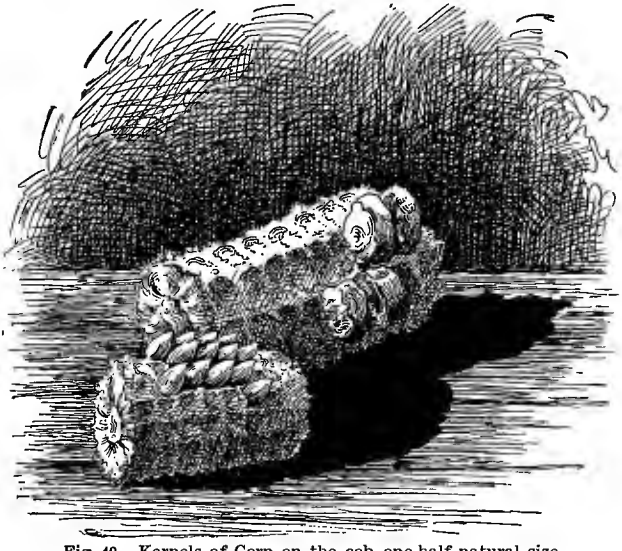

Fig. 49. Kernels of Corn on the cob, one-half natural size. Pop-corn in front, Sweet Corn behind.

CORN, or Sweet Corn, is developed from the Indian Maize (*Zea Mays*); it is often called Sugar Corn. Of great importance as a market-garden and a commercial crop, it is also much grown in American vegetable-gardens. Being very tender, it is not planted till danger

of frosts is over, and is killed by the first real frost in the fall. The warmest and "quickest" of soil should be chosen; the ground should be rich, and well supplied with quickly available fertilizers. A handful of chemical fertilizer beneath each hill is well applied whenever possible; for small gardening operations Corn is occasionally started under glass, and set out when the weather is warm. Corn may be forced under glass under much the same conditions as tomato or eggplant. For table use, the ear is picked when the kernels are plump and well filled, but before it is ripe. Varieties are early (dwarf) and late. The chief Corn diseases are smut and blight. Pests are many.

Soil.—Warm and light, but with a good supply of moisture, and a sunny exposure. Soil should be rich. In rotations, Corn follows clover well.

Hill or Drill Culture.—Corn is usually grown in hills, with three plants in the hill; but in intensive gardening, Corn is often grown in drills, which with a little more work and with less development of each plant, and also with the stalks less able to support each other against the wind, will produce more ears to a given area.

Distances are entirely according to variety, rows from two and one-half to four feet apart; hills in the row the same, single plants a foot to eighteen inches.

Depth.—In spring, about an inch; later, one and one-half to two inches.

Sow.—Under glass, for setting out, in April. In the open, when danger of frosts is over. If the ground is cold or wet, sow thickly in the rows, ten to twelve kernels in the hill. Ordinarily, sow thinly in the rows, five to six kernels in the hill.

Thin to three plants in the hill, or in the row to

Fig. 50. Seedlings of Sweet Corn, nearly natural size.

twelve to eighteen inches apart, according to height of variety.

Set out plants started under glass after the middle of May, or when frosts are past.

Culture.—Preserve the surface mulch, and keep down the weeds.

Fertilizer.—Any good general fertilizer, liberally applied, as corn is an exhaustive crop; should be rich

in nitrogen for a sandy soil. Dress once with nitrate of soda or liquid manure when the plants are up.

Fig. 51.
Plant of Sweet Corn.

Maturity is according to variety, from fifty-five to ninety days.

Pick the ears as they are fit.

Succession.—A late crop can be had in a favorable season by planting an early variety about the middle of July. Plant for succession every two weeks until then.

Storage of corn is only of the ripe ears, for seed.

Diseases.—*Corn-smut* is the worst disease affecting corn, its dark masses being very conspicuous; the plants yield less, and if the fungous growth attacks the ears, these are ruined. Continuous spraying of the ground and plants will control smut to some extent, but is too expensive. The best preventives are collecting and burning all smut as soon as it shows, and avoiding all manure from cattle which have been fed with smutted corn. Use only healthy seed. The sorghum-head smut may be controlled by the same means. Corn blight is destructive, and has not yet been controlled by the known remedies.

Corn pests are more than two hundred in number,

the worst being the cutworm, the wireworm, the corn-stalk borer, and the corn-worm or cotton-boll worm. For almost all of them late fall plowing, and dressing

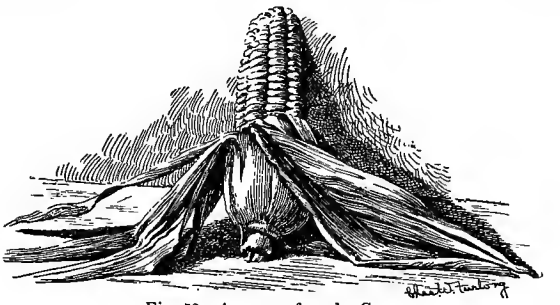

Fig. 52. An ear of early Corn.

with kainit, one thousand pounds per acre, are advised. Rotation is also of value. Against cutworms use poisoned baits. Against wireworms dig into the ground poisoned sweetened dough; rotation, clover being used for the grass crop, and not to be followed by corn or potatoes. For the corn-worm, burn infested stalks and ears. For the corn bill-bug, plant late. For the corn-stalk borer, burn butts of corn; burn over any neighboring marsh land; rotation. For the southern corn root-worm do not plant

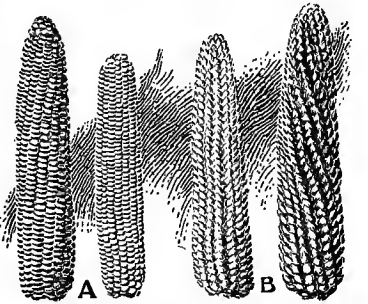

Fig. 53. Types of Corn. *A*, Sweet Corn. *B*, Pop-corn.

with squash or pumpkins; for its beetle spray with Bordeaux or arsenicals, or both. For the western corn root-worm, rotation at least every third year; keep the soil rich.

CORN, POP-. Pop-corn is raised for its mature ears, which are dried and the grains popped by heat, for cooking, candy-making, and eating. It is cultivated like sweet corn.

CORN-SALAD, Fetticus, Vetticost, or Lamb's Lettuce (*Valerianella olitoria*) is an annual salad-plant grown for its leaves, which are very mild in taste; they are occasionally blanched, and sometimes are cooked like spinach. The plant is tender to heat, but (except for the Italian Corn-Salads) hardy to frost, and is chiefly grown as a fall and spring crop. In mild winters or

Fig. 54. Seedlings of Corn-Salad. Two-thirds natural size.

climates it may be gathered out-of-doors through the winter; for winter use, however, it does better in a coldframe. It may be planted like spinach for spring use, and will winter well under a light mulch. Or it

may be sown in the fall for an early spring start. It is a small plant, and the drills may be less than a foot apart if space is scant. Vilmorin-Andrieux names nine varieties; American seedsmen rarely offer more than one.

Soil.—Should be rich; old manure or nitrogenous fertilizers, previously applied, will help the crop. For fall or spring sowing, choose a light, warm soil; for a summer crop, choose heavier and moister land.

Distances.—Drills a foot apart, or even nine inches.

Depth.—Very shallow.

Sow thinly in late August for a crop to be wintered in the open, or for transference to a coldframe. For spring crop sow in late September, or in spring as early as the ground can be worked. As the plant is tender to heat, successional sowings are rarely tried.

Thin to six inches in the rows. Transplant thinnings.

Preserve soil moisture; water in drought.

Fertilizer.—Liquid manure or nitrate of soda, weekly.

Pick the leaves when the plant is about as large as half-grown lettuce. A later crop can be had from the same plant. Plants wintered in coldframes will continue to yield through a mild winter.

Protect young plants in fall under a light mulch.

Blanching is not often attempted, the leaves not having enough flavor to stand the process.

COSTMARY or Alecost (*Chrysanthemum Balsamita tanacetoides*) is a little-grown herb, a hardy perennial, its leaves used in salads. It is propagated by dividing the roots.

Soil.—Preferably light, well drained and sunny.

Distances.—Two by two feet.

Depth.—As before.

Set out root-divisions in spring or autumn. Re-set every three or four years.

Protect lightly in the North.

CRESSES are best reduced to three classes. ("Indian Cress" is *Tropæolum* or Nasturtium; see under Nasturtium.)

(1) **Cress**, Garden Cress, Common Cress, or Pepper Cress (*Lepidium sativum*), is a salad and garnishing plant, very popular in Europe and especially in the neighborhood of London, where with mustard some market-gardeners use as much as 500 bushels of seed in a season. It should be better known in America, being one of the freshest and crispest of salad-plants, of very simple cultivation. Its taste is slightly peppery. A valuable characteristic of the plant is its rapid growth, yielding its crop in from three to four weeks; but as it runs quickly to seed, successional sowings a week or more apart are advisable. The plant and seed are hardy. When the seed-stalk has formed, only the young leaves are palatable. The leaves are used as

garnishing or for salads, and are picked when about three inches in length. Cress is usually a spring or fall crop, not being so good in summer. Vilmorin-Andrieux gives five varieties, but American seedsmen seldom offer

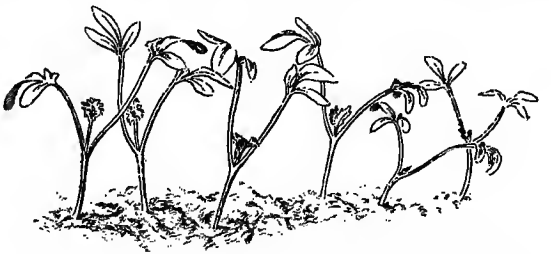

Fig. 55. Seedlings of Garden Cress. Two-thirds natural size.

more than the common and the curled. Its chief enemy is the flea-beetle.

Soil.—Preferably moist, cool and rich, but any good garden soil will do.

Distances.—Rows a foot apart.

Depth.—Shallow; about one-fourth inch.

Sow thickly, as soon as the ground is fit in spring, and at weekly intervals till warm weather; begin again at the middle of August for fall succession.

Thinning is scarcely necessary.

Culture.—Preserve soil-moisture.

Pick when from three to six inches tall; cut the leaves and leave roots to develop a second crop. Or pick as wanted.

In the house Cress can be easily grown, in pots or boxes, by a sunny window.

(2) **Upland Cress**, in two varieties—*Barbarea vulgaris* and *B. præcox*—is known as Broad-leaved Winter, American, Belleisle, Hardy, and Scurvy Cress. It is a hardy plant; the seeds may be left in the ground over winter, to sprout in the spring. It resembles Water Cress in form and flavor; like garden Cress, it is best grown as a fall or spring salad, the leaves becoming tough and bitter in summer. As the leaves lie flat on the ground, they are often soiled by heavy rains. It is of later maturity than Garden Cress, requiring about seven weeks. The varieties are very slightly distinguished.

Soil.—Any good garden soil, not too dry.

Distances. Drills one foot apart.

Depth.—About one-half inch.

Sow as soon as the ground is fit, and again in mid-July for a fall crop. Or sow in September for an early spring start.

Thin to four to six inches.

Pick at about four inches, and again as the leaves grow.

Successional sowings are not usual, as the plant does not bear heat.

(3) **Water Cress** (*Nasturtium officinale*) is a hardy perennial aquatic plant, grown for its leaves, which are used as garnishings, salads, and even for boiled greens. It flourishes naturally in slow-running, shallow water, or at the edges of springs, but with care may be cul-

tivated in shady land, well watered. It is propagated from seeds or root-divisions, and may be started in flats under glass. If cultivated in the garden, choose a shady spot with good loam, fork in manure, and mix in sand or gravel. Watering should be frequent. It may be grown on the outer edge of a hotbed, or will do well in an unused frame. Varieties are few.

Soil should not be muddy.

Distances.—In flats, rows a couple of inches apart, or broadcast; prick out once. Outdoors, rows nine inches apart; or set roots six inches apart each way.

Depth about one-fourth inch for seed; roots as before.

Sow under glass in April; in the open at any time during spring or summer.

Set out house-raised seedlings early in May.

Pick when well established; pick the leaves only, not the roots, and the supply will continue indefinitely.

Succession.—The plants will multiply under favorable circumstances, by their own seeds and roots.

Winter growing of Water Cress is possible in the house or under glass, from roots taken up and kept in good loam, in a warm and moist place.

CUCUMBER (*Cucumis sativus*) is an annual semi-tropical fruiting vine; fruits are picked while immature, and used for salads, for pickling, and occasionally for cooking. It is very tender to frosts, and for early

Cucumber seeds are started under glass; as the young vines transplant with difficulty, pots or inverted sods are advisable. A continuous picking is usually possible once the fruits have set; in fact, if a fruit is allowed to ripen, the yield of the plant is at once lessened, but early solitary fruits should be picked, to aid a more profuse crop. If the plant runs to vine, pinch-

Fig. 56. Seeding of Cucumber. Two-thirds natural size.

ing off the end will often help fruiting. Varieties classify (Cyclopedia of American Horticulture): (1) English Forcing Cucumbers (seldom grown in America except for private use.) (2) Field Varieties.—(*a*) Black Spine type, (*b*) White Spine type. Other Cucumbers are the Sikkim, the Snake or Serpent, and the West India Gherkin. (Ordinary Cucumbers picked when small are often called gherkins.) Cucumber culture is invariably in hills. Pests are numerous and very troublesome.

Soil.—Any good garden soil, but preferably light and neither dry nor wet. Cucumber soil should be in the best of tilth, rich, and "quick." Into each hill well-rotted manure should be spaded, and a handful of chemical fertilizer should also be added. Too much nitrogen in the soil will, however, cause the plants to run to vine.

Distances.—Hills four or five feet each way. For large late varieties four by six feet is advisable. A hill should be about two feet in diameter.

Depth.—Under glass, cover seed lightly. Out-of-doors, about three-fourths of an inch.

Sow.—Under glass, in April. A good practice is to sow several seeds in a five- or six-inch pot, half filled; when the plants are up, pick out all but the strongest; fill in as the plant grows; transplanting is thus avoided. Berry baskets may be used, and set out baskets and all. Or sow in inverted sods.

Sow out-of-doors when danger of frosts is over, about June 1, eight to ten seeds to the hill, on account of insects. Sow for pickles in June and early July. Let all plants grow that will, until it is evident which are the strongest against their pests, when

Thin to four or five in the hill.

Set out house-grown plants when danger of frosts is over. They should be stocky to withstand enemies, and well hardened to bear the sun and wind.

Cultivate till the vines cover the ground.

Fertilizing should be done before the plants are sown or set. Nitrate of soda or liquid manure applied late will make them run to vine, but may be applied frequently in small quantities to the pickle crop.

Pick any early single fruit, to force a numerous growth. Pick all fruits when of proper size, even if not needed, or the plant will cease to bear.

Forcing Cucumbers is very extensively practiced, under conditions favorable to melons or squashes.

Diseases.—For downy mildew spray with Bordeaux, one to eight strength, "early, constantly, and thoroughly" (New York Bulletin No. 119) if necessary twice a week, to keep the leaves well covered with the mixture, especially in humid weather. For blight or leaf-blight, rotation. For anthracnose, rotation; burn diseased vines. For wilt, Bordeaux and rotation. See Farmers' Bulletin No. 231.

Pests.—Chief is the striped beetle, for which sow four days before the Cucumber trap-crops of squash, which the beetle prefers. When the Cucumber plants appear, cover with netting or in some other manner, or preferably spray with Bordeaux, one to eleven; "spray again at the third leaf, and at the third time just before the plants begin to form runners." "When the [squash] trap plants are up, and the beetles appear about them, dust about half the plants with green arsenite, reserving the other half if rain or heavy dew makes the poison soluble and kills the plants first

treated. . . When the beetles commence to pair [most of] the squashes may be cultivated up, leaving only a few of the vines for the beetles to feed on at flowering time, as the insects prefer the squash flowers and will not molest the others. Beans may be used with some success as a fall catch [trap] crop." (New York Bulletin No. 158.)

Other remedies against the beetles are arsenites, air-slaked lime (often used for "driving" the beetles, by sowing before the wind, in the forenoon; the beetles will fly before it to other crops), pyrethrum, hellebore, plaster saturated with kerosene or turpentine, tobacco water sprayed, or tobacco powder. Apply powders when the leaves are wet, and get on both sides of them. Or start the plants under glass; set out the early crop as soon as possible, for a good start before the beetles appear; set out the later crop as late as possible, to avoid the first brood of the pest. Or pick by hand, and trap the beetles under shingles laid about the patch.

The spotted cucumber-beetle may be fought by the same means.

Against the cucumber-worm use hellebore, arsenites, hand-picking. Exterminate the first brood.

Against plant-lice, spray with tobacco water, with one pound whale-oil soap to every fifty gallons; use a bent nozzle to reach the under side of the leaves. Or use bisulphide of carbon in a small plantation, covering the young plants with an inverted bowl, using a tea-

spoonful or more of the liquid; leave the bowl for an hour; the process is slow but sure. Burn all rubbish of the patch.

Against the cucumber flea-beetle use arsenites, Bordeaux if freely used, tobacco decoction, kerosene emulsion, Paris green with land-plaster, one part to fifty.

Against all pests, keep all plants growing well by good fertilization and cultivation. For squash-vine borer and squash bug, see under Squash. For melon-louse, see Melon.

CUMIN, or Cummin (*Cuminum cyminum*), is well known to the Bible and folk-lore. The seeds are offered by some American seedsmen among their herbs. It is an annual plant, grown for its fruit or seed, which is used much as caraway-seed in bread-making, flavoring, confectionery and liqueur-making, being aromatic and slightly peppery in flavor. Sweet Cumin is Anise. Black Cumin is *Nigella sativa*, which see.

Soil.—Preferably warm and quick, well drained.

Distances.—Rows a foot apart.

Depth.—One-half to one inch.

Sow when frosts are past, about June 1.

Thinning is scarcely necessary.

Pick the seed when ripe.

DANDELION (*Taraxacum officinale*) is our common weed, on which the cultivated varieties are great im-

provements. It is grown for its leaves, used as greens and occasionally for garnishing. Dandelion is usually a fall and spring crop, being mostly sown in one spring and finished in the next. The plants may be started under glass, but are usually grown in the open, sown where they are to stand, requiring little care except to pick off all flowers so that they shall not go to seed and become a pest. More than one cutting is possible from the plants, and in the fall they may be protected under frames to give a few winter cuttings. It is possible to use in the garden the seed of the wild plants, but it is best to get the seed of the French cultivated varieties, of which seedsmen offer usually one or more.

Soil.—Any good garden soil, especially if light; the richer the better.

Distances.—Rows a foot or fifteen inches apart.

Depth.—Shallow.

Sow when the ground is fit.

Thin to six inches or more in the rows. Thinnings may be transplanted, if carefully pulled.

Cultivate until the plants cover the ground, which they will do before midsummer, if set one foot apart each way.

Fertilize occasionally with nitrate of soda or liquid manure.

Pick off all flowers.

Cuttings of the leaves may be had in the fall, one or more, especially if covered with sash. The plants

may then be wintered like spinach, under a light mulch.

Blanching of the leaves is possible by means of boards or flower-pots set over the plants.

Forcing the roots like chicory, which see, will give leaves like the Barbe de Capucin. Forced or blanched leaves are less bitter.

Spring cutting may be hastened by glass over the plants; after one cutting or possibly two, they are usually pulled up.

DEW-PLANT. See Ice-Plant.

DILL (*Anethum graveolens*), a biennial herb, grown as an annual for its seeds, which taste much like caraway seeds, but are more bitter. They are used for flavoring, in pickling, and in medicine. For seasoning the leaves are sometimes used.

Soil.—Any well-drained garden soil.

Distances.—Rows twelve to eighteen inches apart.

Depth.—About one inch.

Sow thinly, preferably in spring, when the ground is fit; autumn sowing is possible but not so sure.

Thin to eight inches.

Gather the seeds when ripe, before they fall. The plant will renew itself from its own seeds, if allowed.

DOCK. See Sorrel.

EARTH-NUT. See Peanut.

EGGPLANT, Guinea-squash, or Aubergine (*Solanum melongena*), is a very tender annual plant, seldom cultivated commercially with us north of New York city, and, except in the southern states, invariably started under glass. It is grown for its large fruits, which are edible from one-third the full size until they are fully ripe. The culture of Eggplant is much like that of tomato, though the plants require more care; they must not receive a check from their first starting, in order to get good results. Consequently they are best grown in pots before transferring to the open ground. Eggplants are always grown in hills, which should be made rich and "quick"; two or three good fruits to a vine is a satisfactory crop. Varieties are practically black and white, and large and dwarf. Black are required for the market, but white are excellent for home use; the dwarfs are much earlier than the large, and are to be recommended for

Fig. 57. Eggplant. Pot-grown plant ready for setting in the garden.

short-season climates. There are troublesome diseases and pests.

Soil.—Eggplant does best on a well-drained sandy loam; the wetter and harder, the worse for the crop. The land should be in the best of tilth, and very rich and quick. Into each hill fork compost and a handful of high-grade commercial fertilizer, best in the formula of

Fig. 58. Sprays of dwarf Eggplant. The dwarfs are best for northern culture.

nitrogen 4 per cent, phosphoric acid 8 per cent, potash 10 per cent. A sunny exposure is desirable.

Distances are according to variety; dwarfs, two feet by three feet; standards, three feet by four feet. If the soil is very rich, and the season long, more room may be given.

Depth.—About one-half inch; outdoors, one inch.

Sow under glass in March; plants mature their fruit in from 120 to 150 days, according to variety.

Prick out, in flats, as soon as they crowd; and again when they crowd again. Better results are gained from pot culture, repotting from time to time until the six-

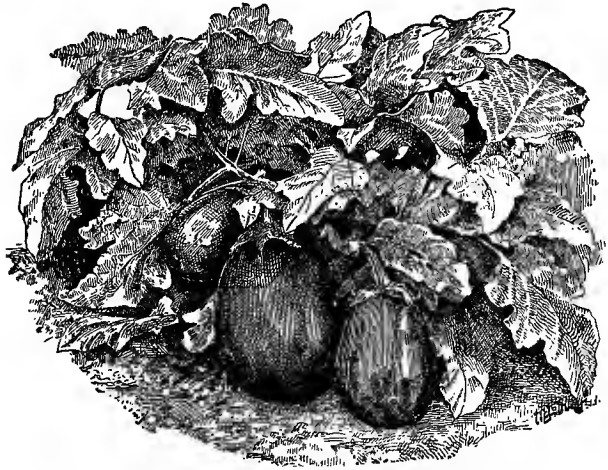

Fig. 59. Eggplant. The common oval shape.

inch size is reached; the plants may be a foot or more in height before setting out in the North. They should be well hardened-off.

Set outdoors when danger of frosts is well over, say the first or second week in June. If set out earlier, hand-glasses may be needed, or some similar protection.

An outdoor crop may be raised in a favorable season. Plant when frosts are past, in hills, three to five seeds to a hill, and thin to one. Give the best of cultivation.

Fig. 60. Eggplant. A round type.

Fertilizing should be done before setting out (see under Soil) with a single application of nitrogen or liquid manure, after setting.

Culture.—Preserve the surface-mulch by constant cultivation, until the plants cover the ground. When three or four fruits are set to each vine, pinch off the end, and also any subsequent blossoms, in order to produce the finest fruits.

Pick the fruit as needed up to the time when it is almost ripe. The young fruits are edible; if they are used, several may be allowed to set to a vine. Very ripe fruits are unsatisfactory.

Diseases.—The chief are a blight-fungus and a leaf-blight, for each of which destroy affected plants and practice rotation; for the latter, destroy insects that can carry infection, and spray with Bordeaux until the

fruits are about to ripen, when use a clear fungicide that will not stain.

Insects.—Against cutworms, use protective devices, such as collars around the young plants; set out poisoned bran or clover baits. Dig for the worm near any injured plant. Against potato bugs, hand-picking, Paris green (1 pound to 75–110 gallons water) and lime. Against aphis and plant-lice, spray with tobacco water, kerosene emulsion, pyrethrum, or hot water, taking care to reach the under sides of the leaves.

ELECAMPANE (*Inula Helenium*) is a perennial herb grown for its root, used in various domestic remedies and once famous for use in pulmonary troubles. It is propagated by seeds, or by divisions of the roots. Often found growing wild; few seedsmen offer the seed.

Soil.—Any good garden soil.

Distances.—Rows eighteen inches to two feet apart, plants eighteen inches in the row.

Sow seed in fall or spring, thinly.

Depth.—About one inch.

Thin to above distances.

Set root-divisions, cut with an eye in each piece, at the above distances.

For use the roots are best when two years old; yearly plantings are preferable, the plants to be dug in their second fall.

ENDIVE (*Chicorium Endivia*) is the French Chicory, a salad plant not as yet properly appreciated in America, for it can be made to follow lettuce in the hot months, and thus to give salads when most other salad plants are at their worst. Endive matures more slowly than lettuce, requiring about seven weeks. To be at its best it should be blanched, for otherwise it is bitter and slightly tough when full grown. Picked young for either salads or boiled greens, it will not require blanching. Endive is hardy to frost, and may be sown quite as early as lettuce outdoors, or may be started under glass and set out when the ground is fit. For late fall

Fig. 61. Seedlings of Endive. Two-thirds natural size.

use, Endive is often transplanted into frames; or for winter use it is taken indoors and slowly blanched in storage. Varieties are of two types,—the curled and the broad-leaved; the curled are more tender. Vilmorin-Andrieux gives thirteen of the curled and seven of the

broad-leaved, with two intermediate; American seedsmen offer no such variety.

Soil.—Any good garden soil. It should be rich and "quick."

Distances.—Plants should stand not less than twelve

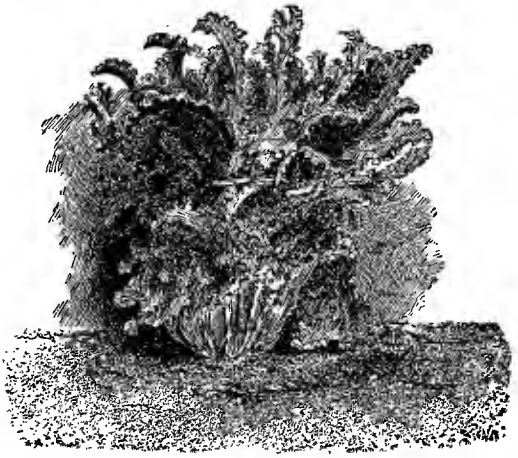

Fig. 62. Plant of curled Endive, tied for blanching.

inches apart each way, except for small varieties. Rows apart as convenient.

Depth.—Shallow, about one-fourth inch.

Sow.—Under glass in March or April; transplant once or twice, and harden off. Sow in the open ground as soon as the ground is fit.

Thin to about a foot apart in the rows. Transplant thinnings. The house-grown or early seedlings do not

transplant so well as lettuce; and they have more of a tendency to go to seed than the August-sown plants.

Set out house-grown plants when well hardened and the ground is fit.

For fall crop, sow Endive in late July or in August.

Pick for salad or for greens at any time after the leaves are four inches tall. Or cut the leaves and allow more to grow. These young leaves are the tenderest. "For eating cooked, we prefer to take the plants quite young, and before they have had time to make heads. With ordinary outdoor culture, they will lose rather than gain in tenderness between this stage and the time when satisfactory heads can be produced." (Waugh, Vermont Bulletin, No. 54.) Once headed, Endive should be

Blanched by excluding the light from the head of the plant. This is done in a variety of ways: by covering with boards or with hay; by tying the heads; by covering with a drain-tile, or with a flower pot with the hole stopped. Or plant in a trench and earth-up or cover over. In any case, the plants should be dry when covered, and kept so. Blanching is completed in from ten to twenty days, according to conditions, and when it is finished the plants should be used at once, or they will decay.

Fertilize by liquid manure or nitrate of soda, every week or ten days, in light applications. But see under

Fertilizer for Lettuce. It seems likely that manure would similarly benefit Endive.

In the fall Endive may be covered with sash, and will then yield very late. Or transplant into sash from the open ground, about September 1.

Storage.—Endive may be taken up, each plant with considerable earth, and stored in a dry cellar or shed. The plants should be dry when lifted, and for convenience may be tied. They will slowly blanch in storage, and when blanched should be used at once. They may similarly be stored in coldframes out-of-doors, at the approach of winter, and blanched as they are required. Place the plants close together.

Pests.—See under Lettuce.

EVENING PRIMROSE (*Œnothera biennis*) is seldom grown as a vegetable. It is a biennial plant with a fleshy tap-root, and bears rosettes of leaves with flower-stalks. Its culture is like that of salsify, using the plant as an annual.

Sow in soil not recently manured, in drills eighteen inches apart, depth about one inch; thin to nine inches. Give good culture. Lift in the fall and store in sand, or in mild climates leave in the ground and dig as needed.

FENNEL is of three kinds. (For Fennel-flower, see Nigella. Sea-Fennel is Samphire.)

(1) **Common Fennel**, also Wild or Bitter Fennel (*Fœniculum vulgare*), is a plant little known in America and seldom cultivated. It will grow in any soil, rows two or more feet apart; being perennial, it will seed itself and multiply indefinitely when once established. The leaves are occasionally used for seasoning, and the seeds in the manufacture of liqueurs.

(2) **Sweet Fennel**, also called Garden Fennel and Long Sweet (*Fœniculum officinale*), is a biennial usually treated as an annual. This plant is much more stoutly stemmed than the wild or common Fennel; the stems are enclosed in the leaf-stalks, and if picked when tender, and served raw, constitute the "Carosella" of Naples, there considered a great delicacy.

Soil.—Any good garden soil.

Distances.—Drills eighteen inches or more apart.

Depth.—One to two inches.

Sow when the ground is fit. In mild climates sow in late September, in order to have the crop come early in the following spring.

Cut the stems while still enclosed in the leaf-stalks, and when young. Serve raw.

Succession.—Sow monthly.

(3) **Florence Fennel**, sometimes called Naples Fennel (*Fœniculum dulce*), is the Finocchio of the Italians, who esteem it highly. It is little known in America; its flavor is delicate, slightly resembling celery, but sweeter.

Soil.—Any good garden soil.

Distances.—Rows two to three feet apart, plants thinned to six inches in the rows.

Depth.—One to two inches.

Sow when frosts are past, and again for succession in about a month. South of New York, sow in early August for fall crops.

Culture.—The plant forms bulbous enlargements at the bases of the stems. When these reach the size of a hen's egg, earth up around the group, barely covering the outer ones. In about ten days, or when they are blanched, cut the outer ones and earth the inner, continuing till all are used. More commonly, however, the whole plant is blanched at once by earthing up, like celery. Serve boiled.

FETTICUS is Corn-Salad, which see.

FEVERFEW, a name sometimes used for Agrimony, is properly *Chrysanthemum Parthenium*, formerly used in domestic medicine, by means of a bitter tonic made from its leaves, and efficient in the cure of fevers. Feverfew is a perennial plant; its single form is preferred for medicine. Sometimes it is called Wild Camomile.

Sow in any good garden soil when the ground is fit, depth about an inch, rows two feet apart, plants one foot apart in the rows. Give ordinary culture and pick the leaves as wanted.

FOXGLOVE, PURPLE (*Digitalis purpurea*), is the common Foxglove, a biennial plant, rarely perennial, raised from seed. The leaves of the second year's growth should be used, and are considered valuable as a sedative and diuretic. Perennial plants may be increased by root-division.

Soil should be light and rich, but not dry. The plant will bear partial shade.

Distances.—Two by two feet.

Depth one-half to one inch.

Sow under glass in March or April, prick out, and set when frosts are past. Or sow when the ground is fit, and thin.

Culture.—Give ordinary care.

Pick the leaves in the second year, preferably when the plant is about to flower.

FUMITORY, or Smoke of the Earth (*Fumaria officinalis*), is a medicinal herb, formerly much used, but now quite neglected. Sow in good soil in spring, in rows eighteen to twenty-four inches apart; thin to one foot. Give ordinary care, and pick as wanted.

GARLIC (*Allium sativum*) is a plant of the onion family, and of a very strong odor and taste, which is stronger still when the plant is raised in a northern climate. It is grown from its cloves or parts of the compound bulbs; the outer ones are best for sowing.

In mild climates these can be planted in the fall, to begin growth in the spring; otherwise, early spring is the time to plant. The plant is seldom offered in America in any variety.

Soil should be rich, light, well drained, and in good tilth. Garlic sometimes rots in wet soil.

Distances.—Rows a foot apart, cloves three to six inches apart in the row. Whole bulbs one foot in the row.

Depth.—Cover the cloves about an inch. Or plant the compound bulbs whole, not quite covering.

Sow in fall in mild climates, or in spring as soon as the ground is fit.

Cultivate the same as for onions, very cleanly. When the tops are of good size, in early fall, break them down, to allow the bulbs to grow larger.

Pull when tops are dead.

Store in a dry place. Garlic

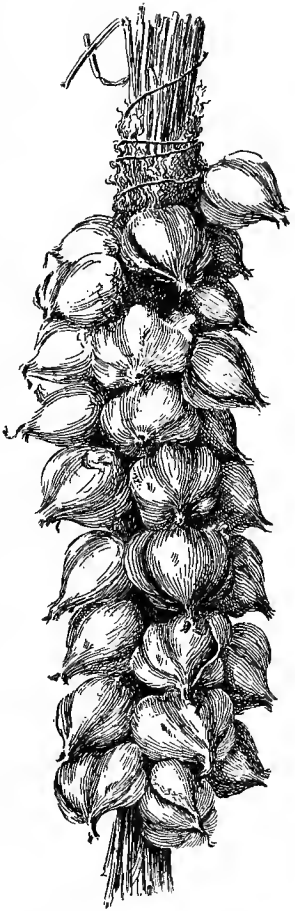

Fig. 63. Bulbs of Garlic, as sometimes prepared for storage.

bulbs are often braided together by their tops and hung up. Or tie as in Fig. 63.

GHERKIN. See Cucumber.

GOBO. See Burdock.

GOLDEN THISTLE. See Scolymus.

GOOBER. See Peanut.

GOOD KING HENRY. See Goosefoot, Perennial.

GOOSEBERRY, CAPE or BARBADOES. See Tomato, Strawberry.

GOOSEFOOT, ANNUAL, or White Quinoa (*Chenopodium Quinoa*), is sometimes grown for its seeds (used in South American cooking and brewing, after boiling to remove their bitter flavor), but chiefly for the leaves, used as spinach.

Soil should be light, warm and quick.

Distances.—Rows twelve inches apart.

Sow thinly when frosts are past.

Depth.—One inch.

Thin to nine to twelve inches in the row.

Pick the leaves as wanted when the plants are established. Pick seeds when ripe.

GOOSEFOOT, PERENNIAL, or Good King Henry, or Mercury (*Chenopodium Bonus Henricus*), is a perennial plant popular in parts of England, as a substitute for and rival of asparagus as an early vegetable. In France the leaves are eaten like spinach; in England the shoots are cut like asparagus or sea-kale.

Soil should be rich and deep. Manure freely for best results; work compost into the hills.

Sow in seed-bed when the ground is warm, drills apart as convenient.

Depth.—About one inch.

Thin or prick out to six by six or six by twelve inches.

Set out the plants when a foot high, or in the second spring, to eighteen inches apart each way, four inches deep.

Culture should be clean; mulch with manure in the fall.

Fertilize each spring with a good general fertilizer; after the cutting season, with nitrate of soda or liquid manure.

Cut or pick when the plants are well established in their permanent positions; shoots are best not cut until the third spring. Pick the young leaves as wanted, lightly in the second year. Cut the shoots from their first appearance in spring for a month or five weeks; cut underground, as with asparagus. Do not exhaust the plants, and allow them to recuperate

during the summer. If the plants are used for spring cutting, do not cut the leaves in summer.

Blanch the shoots, if desired, by earthing up, each spring, to a height of nine inches; for this purpose the rows should be four feet apart. Cut each shoot as soon as it appears.

The treatment of the bed, in general, should be similar to that for asparagus.

Renew every five or six years, or when the plants show less vigor.

Use.—If the skin of the shoots is tough, strip it off. Cook and serve the shoots like asparagus, the leaves like spinach.

GOURDS, which with us are not kitchen vegetables (the English include squash and pumpkin under Gourds), are grown as cucumbers in hills, or trained on trellises.

GROUND CHERRY. See Tomato, Strawberry.

GROUND-NUT, or

GROUND-PEA. See Peanut.

GUMBO. See Okra.

HART'S-HORN PLANTAIN. See Buck's-Horn.

HENBANE (*Hyoscyamus niger*) is a plant whose leaves yield hyoscine and hyosciamine, used medicinally, but poisonous in any but small doses. The herb is annual or biennial, usually found growing wild, but offered by some seedsmen. The leaves are fatal to fowls, whence the name, and to most domestic animals except to swine. The tradition that the growing plants absorb malaria of course disappears before modern theories of the disease.

Soil should be light.

Distances.—Rows twelve to eighteen inches apart. Thin to nine inches in the row.

Sow when frosts are past, or under glass.

Pick the leaves in the second year.

HERB-OF-GRACE. See Rue.

HERB PATIENCE is Patience Dock. See under Sorrel.

HERBS.—See under their names. As a rule, plant on good, light earth in the best of tilth, cultivate frequently, gather when dry, dry in the house, in a warm, not hot room, pulverize, and store in an air-tight receptacle.

HOP. The Common Hop (*Humulus Lupulus*) is sometimes used as a vegetable, the shoots being cut in

the spring for use as a substitute for asparagus. The plant, a perennial, is best propagated by root-divisions or by cuttings; it does not come true from seed.

Soil should be rich and deep, enriched with well-rotted manure for each hill.

Distances.—Three feet by one. Set a pole for each plant.

Set in spring, roots as deep as before.

Set cuttings in June in seed-bed, shade and water till established. Set out permanently the following spring.

Cut the shoots for a few weeks in early spring, and very lightly until the third year. After cutting, allow them to grow to store up strength for the next year. If the plants are grown for their shoots, pick off all flowers.

Fertilize yearly with a good general fertilizer.

Renew when the plants show less vigor.

From seed.—Sow in seed-bed, rows fifteen to eighteen inches apart; thin to one foot. When one inch high, or in the second spring, set at the permanent distances.

HOREHOUND (*Marrubium vulgare*) is a perennial plant, grown for its leaves, used for coughs and colds. It is hardy, and is propagated by seeds, root-divisions, or by cuttings, and, once established, will persist indefinitely.

Soil.—Light, warm, and dry, well enriched.

Distances.—Rows two feet apart, plants a foot apart in the row. Or set the plants eighteen inches apart each way.

Depth.—One-half inch for seed. Root-divisions as before.

Sow when the ground is fit, thinly.

Thin at three inches high, to six inches apart.

Transplant the intermediate plants, when six inches high.

Set root-divisions in spring.

Start cuttings in June, in shady position. Set in plantation when once established.

Dress each spring with well-rotted manure, or with a good general fertilizer.

Culture should be clean.

Gather the leaves when the plant is growing well. Pick lightly the first year; afterward, pick heavily twice a year, in midsummer and fall.

Use.—Boil the leaves and strain, add sugar and boil till thick enough to harden.

Protection not necessary.

Renew from root-divisions when the plants show less vigor. Or root-prune every second year.

HORSE-RADISH (*Cochlearia Armoracia*) is a perennial plant which for best results should be grown as an annual. It is grown for its roots, used grated as a con-

diment, and is propagated from root-cuttings, which may be taken from the plant when the roots are dug in the fall. Horse-radish being very hardy and persistent, all the roots should be taken up, or the plant will become a pest, unless persistently cultivated out. Old-fashioned gardening allows the roots to remain from year to year, to be dug as wanted; the results are inferior to those from annual planting, as here advised. Use of old crowns for reproduction, which is an old method, is also no longer advised. Pests are chiefly those of cabbage, which see. Diseases are not troublesome. (See, also, Wasabi.)

Fig. 64. Horse-Radish. A good root.

Soil should preferably be a medium loam, deep, and moderately rich and moist. Dry soils give woody roots with weak taste; wet soils make soft roots with too strong flavor. Subsoil should be open for drainage and to allow the roots to penetrate; otherwise the main root will branch.

Distances.—Rows two feet or more apart; cuttings twelve to eighteen inches in the row.

Depth varies according to purpose. It is usual to plant the cuttings three to six inches deep; planted among other crops, which are at first to occupy

the land, the cuttings are sometimes set as much as a foot deep.

Position is usually slanting, the larger ends all pointing in the same direction. They may, however, be set horizontally or upright.

Cuttings, or "sets," may be bought of seedsmen or made when digging the year's crop, and are from the small or side roots. The usual length is six inches. They should always be carefully cut square at the upper end, slanting at the lower, to distinguish the ends, as the upper end should never be set deepest. Tie in bundles and store.

Fig. 65. Horse-Radish "sets." The bottoms are cut slanting.

Set out in spring as soon as the ground is fit. Fall planting is possible and is occasionally practiced.

Culture should be clean and frequent.

Fertilizer should be rich in potash, and worked in deeply to prevent branching of the roots. A mixture containing 10 per cent potash, 7 per cent available phosphoric acid, 4 per cent nitrogen, 1,000 pounds per acre, would be satisfactory.

Dig in fall, or in the following spring.

Storage.—Cuttings may be stored in sand in the cellar. Roots may be similarly stored, to preserve their pungency.

Pests are the same as for cabbage, which see.

HORSE-RADISH, JAPANESE. See Wasabi.

HYSSOP (*Hyssopus officinalis*) is a hardy shrub, perennial, grown for its flowers and leaves, which are aromatic and somewhat bitter, and are used in seasoning. The plant is propagated from seed, cuttings, or root-divisions. Varieties are red-, white- and blue-flowered.

Soil.—Should be light and warm, and well limed.

Distances of the mature plants, twelve to eighteen inches apart each way.

Depth of seed.—About one inch. Root-divisions and cuttings as before.

Sow seed in April, either in rows where the plants are to stand, or in a seed-bed for transplanting in June.

Thin in seed-bed to six inches, in permanent rows to twelve inches or more.

Set root-divisions in fall or early spring.

Take cuttings in June, set in a shady place and water until established.

Pick the leaves as wanted; take the flowers when the spikes are in early blossom. Dry and store.

Renew the plants by division, or at least root-prune, every three or four years.

ICE-PLANT (*Mesembryanthemum crystallinum*) is sometimes called Dew-plant, on account of the glistening spots on its foliage. The plant is perennial, but tender, and is best used as an annual. It thrives in

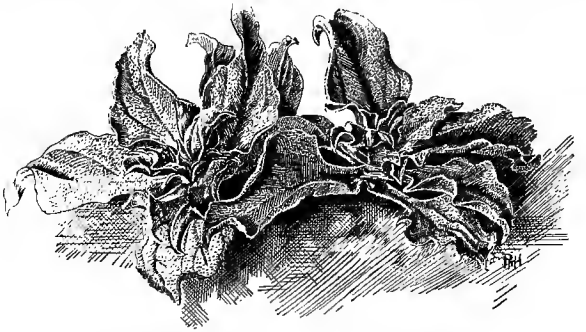

Fig. 66. Ice-Plant. One-fourth natural size.

heat and stands drought well. It is used like spinach but is chiefly regarded as a curiosity. New Zealand Ice-plant is New Zealand Spinach, which see under S.

Soil.—Light and quick.

Distances.—Rows one foot apart; thin the plants to six inches or more in the row.

Depth.—Shallow.

Sow under glass in April, and set out in late May. Sow in the open, late in May, or early in June.

Pick the leaves as wanted when once the plant is

established. Cook and serve as spinach; the flavor is slightly acid.

ICE-PLANT, NEW ZEALAND. See Spinach, New Zealand.

JUR-NUT. See Peanut.

KALE (*Brassica oleracea acephala*) is a non-heading plant of the cabbage family, grown for its leaves, which it bears either on a stalk or close to the ground; varieties

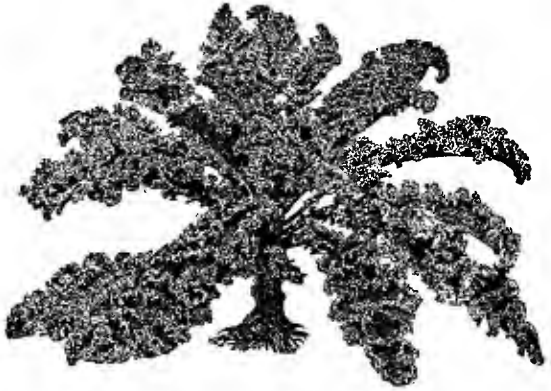

Fig. 67. Plant of curled Kale.

have leaves of several colors. The leaves of Kale are usually curled at the edges, and the plants, being ornamental, are frequently used for bedding purposes, or for garnishing. The low-growing Kales do not transplant

well, and are therefore usually sown where they are to stand. Kale is most prized as a spring or as a fall crop; for a spring crop it is often planted late and allowed to remain in the field during the winter, requiring in cold places only a light mulch. There are several varieties, their characteristics indicated above, some being dwarf. The low-growing Kales winter best. Sea-Kale is another plant; see under Sea-Kale.

Soil as for cabbage,—strong, moist, and well enriched.

Distances.—Rows and plants in rows, eighteen to thirty inches apart, according to variety.

Depth of seed.—One-half to one inch.

Sow in the North usually in the open ground, in April or May, and again in August for wintering.

Transplant the tall varieties from seed-bed at four to six inches. The low-growing kinds transplant with difficulty, and should be set shallow, keeping the earth out of the centers. They are best sown thinly in rows where they are to stand, and thinned, when well up, to eighteen inches or more.

Fertilizer.—Kale does well if fed at intervals with liquid manure or nitrate of soda, like cabbage, which see.

Pick the leaves as wanted, or pull the whole plant. The leaves are best after they have been touched with frost.

Break down all flower-stalks as soon as they appear.

Diseases and pests, see cabbage.

KNOTROOT. See Stachys.

KOHLRABI, or Turnip-rooted Cabbage (*Brassica oleracea caulorapa*), is a variety of the cabbage family grown for the enlargement of its stem, just above the ground, which should be eaten when immature, about three inches in diameter. Kohlrabi is, like all plants of its family, hardy to frost. Varieties are several, according to color; the early maturing, if they can be had, are best in the North. Shapes vary slightly. The English give the name of Turnip-Rooted Cabbage to the Rutabaga.

Fig. 68.
Kohlrabi. The common shape.

Soil.—Any good cabbage soil, strong, rich, and moist.

Distances.—Drills apart eighteen inches. Kohlrabi is best sown where it is to stand, as it transplants poorly.

Depth.—About one inch.

Sow.—Kohlrabi may be started under glass, best in pots in March or April, but is not usually considered worth the expense. Sow thinly in the open ground where the plants are to stand.

Thin to six inches or more in the rows.

Culture.—Keep the earth from the heart of the plant, and do not cover the knob.

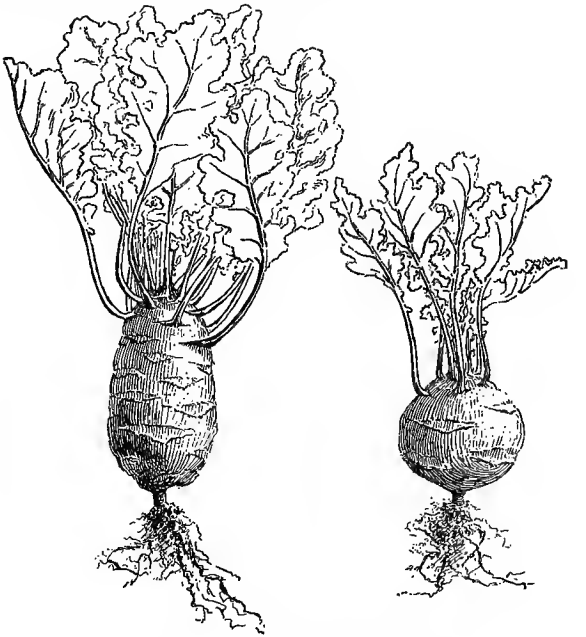

Fig. 69. Other types of Kohlrabi.

Fertilize at intervals with liquid manure or nitrate of soda.

Succession may be maintained by sowings every two weeks until the first of August.

Pull the plants before they are full-size, the knobs

not larger than three or four inches, according to variety. If allowed to grow too large the knobs become tough.

Store.—Some varieties store well, in a darkened cellar.

Diseases and pests are those of cabbage, which see. Cabbage-worm and clubroot are most troublesome.

LAMB'S LETTUCE. See Corn Salad.

LAMB'S QUARTER. See Pigweed.

LANTERN PLANT. See Tomato, Strawberry.

LAVENDER. There are two shrubs known by this name, and of the same family, *Lavandula*, which are grown for their flowers and leaves, used in perfumery, or as a domestic medicine. Medicinal use of lavender is now very rare, but the leaves are sometimes used for seasoning.

(1) **True Lavender** (*L. vera*) gives the best perfume. It is a small shrub, seldom more than three feet high.

(2) **Common Lavender** (*L. spica*), a smaller shrub of more open growth.

These two shrubs are grown in much the same manner, from cuttings; they do not always come true from seed, and root-divisions give weakly plants.

Soil should be light, dry and rather poor.

Distances.—Of the mature plants, about four feet

by two feet for best results. They are often planted more closely, and may be used as an edging.

Sow seeds in spring, when the ground is warm. Depth about one inch. Seed-bed rows eighteen inches apart. Thin plants to nine inches apart.

Transplant in fall or early spring.

Set root divisions in spring.

Propagation by cuttings in the best method. Use "cuttings of one season's growth taken with a heel of older wood, in late autumn or early spring" (Cyclopedia American Horticulture). Set in moist, shady soil, one to two feet apart each way, and when they are well rooted set in the open at above distances.

Pinch off all flower-buds the first year.

Pick the flower-spikes before they fade, preferably in dry weather. To keep, tie a bunch of the spikes by their stalks, turn the stalks back over the spikes, and tie again, for protection.

LEEK (*Allium Porrum*) is one of the onion family, second in commercial importance to the onion itself, being extensively used in the south of Europe, and by the Scotch, English and French as a vegetable, cooked or raw, but chiefly for seasoning. It forms no bulb, but its sheaf of leaves, especially when blanched, is tender and of milder flavor than the onion. Leek is usually a seed-bed crop, and is best when blanched. Varieties are few.

Soil.—Deep, rich, and moist, in the best of condition.

Distances.—In the seed-bed, rows apart as convenient. Sow thickly, and thin to two inches apart in the

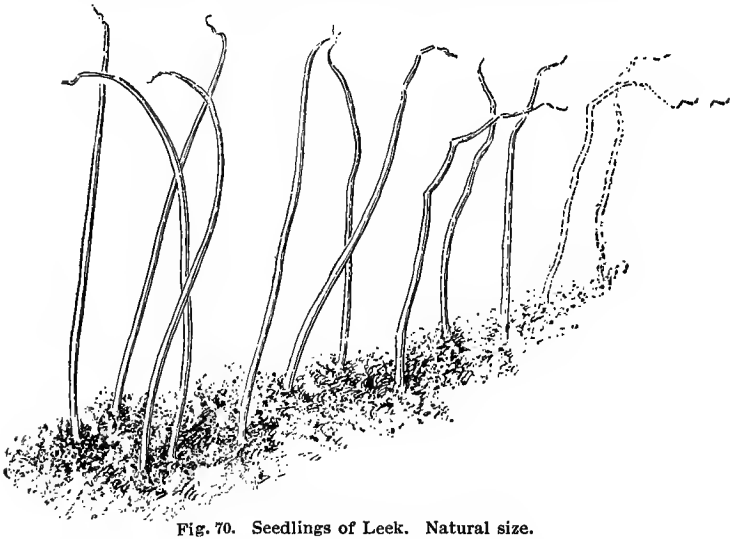

Fig. 70. Seedlings of Leek. Natural size.

rows. In the field, rows eighteen inches or more apart, plants six to nine inches apart in the rows.

Depth for seed.—About an inch.

Sow.—Leek may be started under glass, in March or April. Sow outdoors as soon as the ground is fit.

Transplant to permanent positions when five to six inches tall, cutting back both top and roots. Plants raised under glass should be hardened off.

Set out according to the result desired. For a green Leek, set as deep as before. For a blanched Leek, set (1) in furrows, five to six inches deep; (2) in holes made with trowel or dibber, same depth. Various other methods are used in different countries, the principle being to set the base of the stem about six inches under ground, not filling in at first, but allowing the rains and subsequent cultivation to level the ground, after which the rows are earthed-up, but not until the plants are vigorously growing.

Culture.—In the above, keep the earth from the heart of the plant. Earth when the plants are growing well. For green Leeks the plants are not earthed-up.

For spring crop, Leeks may be sown in August or September and wintered under frames, to be set out in spring. This is done chiefly in mild climates.

Pick as wanted, by pulling the whole plant.

Store in boxes in the cellar, or, as Leek is hardy, in trenches like celery, taking up the plants, roots and all, and setting closely.

Fig. 71. Leek. Mature.

Diseases and pests, see under Onion.

LEMON, GARDEN. The Garden Lemon is of the Melon family. See Melon.

LENTIL (*Lens esculenta*) is an annual leguminous plant grown for its seeds, used either fresh or dried. It is exceedingly nutritious, and is of great importance in the orient and in southern Europe, but is not well suited to our northern climate.

Soil.—Light and dry.

Distances.—Drills about eighteen inches apart. Thin to three inches apart in the rows.

Depth.—About one inch.

Sow when the ground is fit.

Culture.—Preserve the surface-mulch.

Harvesting.—When the stems become yellow and the pods turn dark in color, pull the whole plant and dry in the sun. Pick off the pods when dry.

Store the pods whole, as the Lentils do not keep so well when shelled.

LETTUCE (*Lactuca sativa*) is our best-known salad plant, grown for its leaves, which are seldom eaten cooked. It is an annual short-season plant, often used as a succession or companion crop, to follow or precede another crop, or to use the intermediate spaces of a wide-spaced crop while that is coming to maturity. Thus, being hardy, it may precede tender crops, or its heat-resistant varieties may follow strawberries, or may

be planted between young plants of the cabbage family. It is managed partly according to its types, of which botanically there are four: head lettuce, cut- or curled-leaved, the Cos (with upright leaves) and the narrow-leaved. For this last see Asparagus Lettuce, and for practical purposes add to the list the bunching or loose-heading type, which is the earliest of the lettuces.

Fig. 72. Lettuce seedlings. Natural size.

Lettuces vary in color (reddish borders or blotches) and in the shape of the leaves, the edges of some being finely crimped or curled. Seedsmen distinguish between white- and black-seeded lettuces, the former grown chiefly for forcing, the latter chiefly out-of-doors.

Lettuce may be grown throughout the winter by the help of forcing methods, not considered here. For outdoor gardening the earliest crop is started under glass, and either set out or allowed to mature in the

frames. When the ground is in good condition the first outdoor sowing may be made, as Lettuce is very hardy to frost. Successive sowings may be made weekly to fortnightly, or by good management and transplanting still less often. In the summer many lettuces run quickly to seed, and heat-resisting varieties should be chosen; these may be found in all types of Lettuce. On the other hand, the Cos, although historically a hot-weather Lettuce, now exists in earlier varieties.

Fig. 73. Plant of heading Lettuce.

In the handling of Lettuce the varieties must be used according to season, but the culture of all is practically the same. Lettuce transplants well and is much transplanted, except in the fall in the open ground. Heading is largely a matter of variety. Lettuce should be given clean culture, water, and food, and should be properly thinned. Manure is the best fertilizer. Trade varieties are numberless. Pests and diseases are not troublesome.

Soil.—Lettuce will grow in any good garden soil, but best results are to be had with earth that is light, warm and "quick." Where summers are hot a moister soil is good for the warm-weather kinds. The ground

should be in good tilth, and plenty of good manure, well-rotted, should be spaded in. See under Fertilizer.

Distances.—Under glass sow in drills a few inches apart, prick out at the second leaves to four inches apart each way, and set again if they crowd. In the open, seed-bed drills six inches or more apart. Sown where the plants are to stand, drills should be one foot apart.

Depth.—Under glass one-fourth inch. In the open one-half to one inch, according to soil and season.

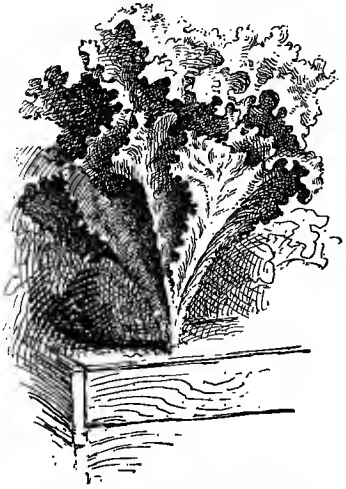

Fig. 74. Plant of curled Lettuce.

Sow under glass early in March. Outdoors as soon as the ground is fit, and successively every ten days or two weeks thereafter. If a row is well managed (as below) some plants being left to develop rapidly, and the thinnings transplanted to come on more slowly, sowings need not be oftener than every three weeks or even more. Sow early crops in seed-bed; autumn crops are best sown thinly where they are to stand, and thinned in the rows.

Thin the seed-bed rows to one to two inches apart for the best results.

Transplant at four inches into rows one foot apart, six, nine or twelve inches in the rows, according to the size at which the plants are wanted. One foot apart each way will usually give room for full development.

If not transplanted it is a good plan in home gardening to make an early thinning, so that the plants shall not crowd. When they get to be about five inches tall, growing very close together, thin to three inches apart, and eat or transplant thinnings. Thin again to six inches and finally to a foot apart in the rows, allowing the remaining plants to grow to full size before picking.

Culture.—Keep the surface-mulch in good condition. Do not hoe the earth against the plants, nor get earth upon or in them. If watered with liquid manure, or if nitrate of soda is scattered about the plants, take care not to get the fertilizer on the leaves.

Fertilizer.—Liquid manure or nitrate of soda may be applied at intervals with benefit if the soil is not rich. But if the ground has been thoroughly enriched with barnyard manure, no further fertilizing is needed. It has been proved by station tests that "after the soil has received a heavy application of stable manure, any application of chemical fertilizers is only thrown away." "Sulfate of soda was found to be highly injurious,

especially when used with muriate of potash." (Farmers' Bulletin No. 105.)

Pick the crop as wanted,—best in early morning.

Successional sowings should be made as above (under Sow), noting that in the heat of summer Lettuce needs careful transplanting, and that late-sown plants do best when sown where they are to stand. Sow for winter use in August or early September, and transplant into frames or the greenhouse.

Pests.—The cabbage-worm will occasionally attack Lettuce and must be picked by hand. If a plant is found wilted down, dig for a white grub near or beneath it. Such a plant, if the roots have not been entirely cut off, will sometimes start again. Water and give shade. If the plant is found cut off at the surface, dig for the cutworm. For cutworms and white grubs, dress the ground with nitrate of soda, muriate of potash or kainit, and water freely to carry the salts into the ground.

LETTUCE, ASPARAGUS. Asparagus Lettuce is mentioned by Vilmorin-Andrieux, and is the narrow-leaved type included above. It is of little importance as a garden vegetable, as it runs to seed quickly. For the table it is gathered when the leaves, with their soft, thick stems, are about a foot high, and is served like asparagus, or used for a salad. It is cultivated like common Lettuce.

LETTUCE, PERENNIAL. Also given in Vilmorin-Andrieux, "but the product of the plant is so trifling that it is hardly worth cultivating." It resembles the dandelion in growth, and is chiefly used where it grows wild, in the south of Europe and elsewhere.

LOVACHE or LOVAGE (*Levisticum officinale*) is a plant now little cultivated, but formerly grown for its stems and leaf-stalks, which were used as a pot-herb, or blanched and eaten like celery. The stems and stalks may be candied like angelica. The plant is a hardy perennial, and when once established will yield for several years. It is propagated from seed, but more satisfactorily from root-divisions.

Soil.—Any good garden soil. Enrich well with manure if the plantation is to last for some time.

Depth of seed, one inch; of root-divisions, as before.

Sow seeds as soon as they ripen, in midsummer, in seed-bed, rows one foot apart; thin to six inches.

Transplant the following spring to two feet by eighteen inches.

Set root-divisions in spring at the same distances.

Earth-up like celery, in the fall.

Gather.—For greens, pick the leaves as wanted when the plant is well established. Cut the stalks when blanched. Do not use the plants for both purposes in the same year.

Renew or root-prune every three or four years.

LOVAGE, SCOTCH (*Ligusticum Scoticum*) is a plant now little known, formerly used as a pot-herb. It may be grown like common Lovage, above, but in moist ground. The root is sometimes eaten.

LOVE-APPLE is Tomato.

LOVE-IN-A-MIST. See *Nigella sativa.*

LICORICE (*Glycirrhiza glabra*) is a perennial plant grown for its root, from which is extracted the Licorice of commerce, and occasionally domestic medicines, for troubles of the throat, and for colds. It is best propagated by means of its running root.

Soil.—A medium loam, deep and well enriched.

Distances.—Three feet by eighteen inches.

Depth.—Two to three inches.

Set out in spring.

Culture.—Give clean tillage; in the fall cut down to the ground.

Cutting for the roots should not be begun for three years. After that cut regularly in the fall, for use and for cuttings, each of which for propagation should be six inches long and have one or more buds or eyes.

Store cuttings in sand in the cellar.

Mulch over winter, north of New York city.

To make licorice, crush and boil the roots; evaporate the product, which may be rolled into sticks while still

soft. When pure and well made, the licorice should dissolve entirely in water. The woody roots are often kept for use.

From seed.—Sow very thinly, when the ground is fit, in rows eighteen inches apart; depth, one inch; thin to one foot. Give clean culture. Transplant in fall or spring to the permanent distances.

LIQUORICE. See Licorice.

MALLOW, or Curled Mallow (*Malva crispa*), is an annual plant grown for garnishing. It is often grown in beds, and, if allowed, will seed itself from year to year.

Soil.—Any good garden earth.

Distances.—In seed-bed, rows apart as convenient; permanent distances, two by two feet.

Depth of seed, one inch; of seedlings, as before.

Sow in seed-bed when heavy frosts are past.

Thin to three inches.

Transplant at five to six inches to permanent distances.

Pick as wanted when the plants are established.

MALLOW, JEW'S. Jew's Mallow (*Corchorus olitorius*), is a very tender salad-plant, scarcely known in America. Sow when frosts are past and cultivate like spinach.

MALLOW, MARSH. See Marsh-Mallow.

MANGEL-WURZEL is a variety of Beet, grown for stock-feeding, very rarely for the table. It is grown like Beet, distances about nine by eighteen inches. For the table, pick when young.

MANILA-NUT. See Peanut.

MARIGOLD, or Pot Marigold (*Calendula officinalis*), is grown for its flowers, which when dried are used in seasoning, or in coloring butter or omelettes. The plant is a hardy annual, and blooms continuously from summer till heavy frosts. Varieties are single- and double-flowered.

Soil.—Any good garden soil.

Distances.—Rows one foot or more apart.

Depth.—About one inch.

Sow when the ground is fit.

Thin to nine or twelve inches. Thinnings may be transplanted.

Pick when the flowers are well open, dry slowly, and store.

MARJORAM, POT. Pot Marjoram (*Origanum vulgare*) is a perennial herb, very hardy, grown for its leaves and tender shoots, used in seasoning. It is grown from seed, from root-divisions or from cuttings.

Soil.—Any good garden earth.

Distances.—Rows one foot apart.

Depth.—About one inch.

Sow when the ground is fit, in seed-bed or where the plants are to stand.

Thin or *set out* to one foot each way.

Take root-divisions in spring or fall.

Take cuttings in summer; set in shady place, and water till established.

Cut the leaves as wanted when the plant is established.

Re-set or trim roots every three or four years.

MARJORAM, SWEET. Sweet or Annual Marjoram is of the same family as the above, being *O. Majorana.* Although a perennial, it seldom survives a cold winter, and is usually grown as an annual, propagating by seed. It is grown for its leaves and tender tips, of bitter and spicy taste, used in seasoning and in domestic medicine.

Soil.—Any good earth.

Distances.—One foot each way.

Depth of seed, about one inch; of root-divisions, as before.

Sow under glass in March, or outdoors when heavy frosts are past.

Thin or *set out* to the permanent distances.

Take root-divisions in spring.

Cut for use as wanted, when once the plant is well established.

Protect heavily north of New York city.

MARROW, VEGETABLE. See under Squash.

MARSH-MALLOW (*Althæa officinalis*) is a woody perennial herb, grown for its mucilaginous roots, used as a demulcent and in the manufacture of candy. It is grown from seed or from root-divisions.

Soil.—Any good garden earth, but preferably moist.

Distances.—Two feet by one.

Depth of seed, one inch; of root-divisions, as before.

Sow when the ground is fit, in seed-bed or permanent positions.

Thin or transplant to permanent distances.

Take root-divisions in spring.

Dig the roots for use as wanted, after two years' growth. Or

Root-prune in spring, leaving parts of the roots to continue growth.

MARTYNIA, offered by seedsmen in two varieties, Proboscidea and Craniolaria, is a hot-weather plant, sometimes called Unicorn Plant, grown for its seed-pods, which are picked while young and tender, and used for pickles. It may be started in the house, in

which case it is best grown in pots for setting out, and treated like tomato. Or it may be started in a hotbed, and allowed to mature there without transplanting, gaining much time over ordinary outdoor culture.

Soil.—Warm, dry, and quick.

Distances.—Three by three feet, or more if the soil is very rich.

Depth.—One inch.

Sow under glass in April, and transplant into pots as the plants crowd. Sow outdoors at the end of May or early June, several seeds to the hill, and

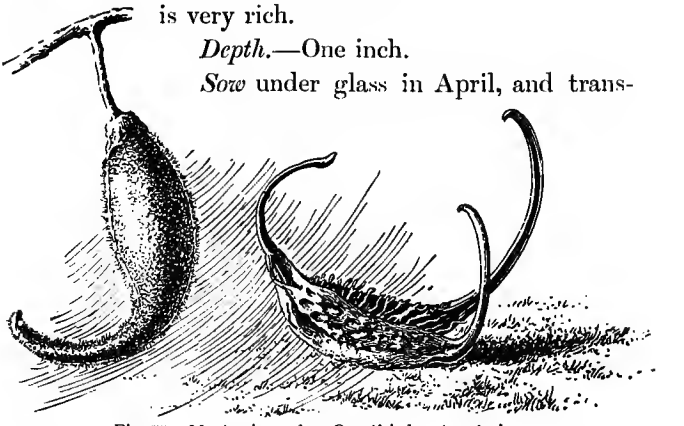

Fig. 75. Martynia pods. One-third natural size.

Thin to one plant in the hill.

Set out when frosts are past, about June 1.

Culture.—Preserve the surface mulch.

Pick the pods while still tender, or they are worthless; continue picking as they develop.

Seed-bed culture is possible, if the position of the

bed is warm and sheltered, to bring them forward faster than in the open field. Thin to six inches apart. Transplant with care, with a ball of earth at the roots.

MELON. See under Muskmelon and Watermelon.

MELON PEACH is cultivated the same as Muskmelon.

MELON, PRESERVING. See Watermelon.

MERCURY. See Goosefoot, Perennial.

MINT (*Mentha*), in three varieties—Spearmint (or Green Mint), Peppermint, and Japanese Mint—is frequently grown in kitchen-gardens, in use in the order named, the Japanese mint being something of a curiosity. The culture of all is the same; Spearmint is used chiefly for

Fig. 76. Spearmint in flower. One-third natural size.

mint sauce and juleps; Peppermint is used for medicine and confectionery, and seldom for seasoning. Catmint is Catnip.

Soil.—Any good garden soil, preferably moist.

Distances.—Mint is usually grown in beds, the plants allowed to spread at will. Best results come from drills eighteen inches or more apart, with clean culture between the rows.

Depth.—About one inch.

Sow seed in spring, where the plants are to stand; or sow in seed-bed, well watered, rows one foot apart; thin to three inches in the rows.

Transplant in fall or spring.

Propagation by root-cuttings is most usual, the roots divided in spring and set where they are to grow. Set the divisions two inches deep.

Cuttings may also be used, taken in summer, shaded, and watered till established.

Protection is not necessary.

Cut the leaves as wanted, when the plants are well established.

Store in a dry place. Or

Lift plants for winter use in the house, keeping in a sunny place in a temperature of about 60°.

MUGWORT (*Artemisia vulgaris*) is a hardy perennial plant, the leaves used for seasoning, being aromatic and bitter. It is grown from seed, cuttings, or roots.

Soil.—Any good earth.

Distances.—Twelve by eighteen inches.

Depth of seed, one inch; of root-divisions or rooted cuttings, as before.

Sow when the ground is fit, in seed-bed, or where the plants are to stand.

Thin or transplant to permanent distances.

Set roots in spring or autumn.

Take cuttings in summer, and water till established.

Cut the leaves as wanted, after the plant is well established.

Renew or root-prune every few years.

MUSKMELON (*Cucumis Melo*) is grown in several varieties for its fruits. It is a warm-season plant, tender to frost, and for an early crop must be started under glass, by which means two crops may be had in a season, and are often planted on the same ground, the later between the earlier. The common varieties are chiefly the cantaloup (with hard and warty, scaly, or furrowed rind) and the nutmeg or netted muskmelon (with softer or netted rind); the latter has the shorter season and is therefore better adapted to growing in the North. Besides these, there are the winter or long-keeping types, forcing melons, and preserving melons, all of which are grown in the same manner, whether out-of-doors or under glass. Diseases and pests are mostly the same as cucumber. Melons

planted with cucumbers do not hybridize, as is popularly supposed.

Soil should be light, warm, and quick. In heavier soils the hills should be well enriched with compost; if clayey, sand or sifted coal-ashes should be worked in. If wet, the soil should be drained. As muskmelons are always grown in hills, the richer these are made, on

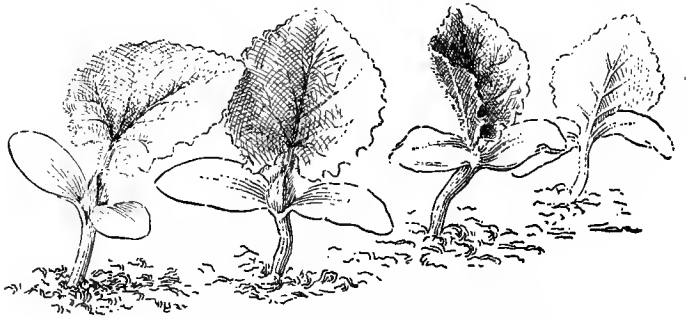

Fig. 77. Muskmelon seedlings. Nearly natural size.

whatever soil, the better. On some soils it is even advisable to remove the earth of the hills about two feet across, and replace it with compost. Or fill the holes with well-rotted manure, covered with three or four inches of good soil, in which to sow the seed.

Distances are somewhat according to soils. The best general distances are four by six feet; if the soil is very rich, give more space; if poor, give less.

Depth.—One-half to one inch.

Sow under glass in April, in pots or baskets or on

inverted sods, as melons transplant poorly. Several seeds to each receptacle, thin to one.

Sow outdoors when danger of frosts is over, seldom before the first of June. Sow six to twelve seeds to a hill, according to the danger from insects; and, when the plants are well growing,

Thin to three in a hill.

Set out house-grown plants when frosts are past. The seed of the main crop may be sown between them.

Culture. — Preserve the surface mulch until the plants cover the ground. For best fruits, after four have set on a vine, pinch off all subsequent blossoms.

Fig. 78.
Muskmelon.

Fertilize with one light dressing of liquid manure or of nitrate of soda, when the plants are small.

Pinch off the ends of the vines when about eighteen inches long, to induce branching, as the fruits are better when thus distributed.

Pick when ripe, which is usually known by the ends turning soft. Pick winter melons before they ripen, and all melons before frost can hurt the fruit.

Store winter melons in a cool cellar to ripen.

Diseases and pests are mostly those of cucumber. For melon-louse, use methods against plant-lice as under cucumber, or underspray with kerosene emulsion, one to ten, but made with whale-oil soap, and best mixed with Pyrethrum.

MUSTARD, which is of the Brassica or Cabbage family, is in several varieties used as a salad or a pot-herb plant. It runs to seed in warm weather, and should therefore be sown in spring or fall; the seed will live over winter in the ground. Clean culture is necessary to prevent the seedlings from running wild, and the plant should not be allowed to seed itself and become a pest. The white Mustard is chiefly used as a salad plant, sown broadcast or in drills; the black or brown Mustard, the southern, and the Chinese varieties, some of them curled, are used chiefly for pot-herbs, and should be better known. Most of them are easily raised under glass, especially the white.

Soil.—Any good garden soil, preferably warm and quick.

Distances are somewhat according to variety; the white either broadcast on small areas or in drills nine inches apart, the others in drills twelve to eighteen inches apart, thinned to four to eight inches in the row.

Depth.—For the white, one-half inch. For the others, one inch.

Break down all flower-stalks as soon as they appear.

Pick only the young leaves, of the white and black varieties, as wanted. Of the larger varieties all the leaves may be gathered. Pull whole plants or pick the leaves as wanted.

Sow in September for a spring crop; as soon as the

ground is fit, for an early summer crop; and again in August for a fall crop.

Diseases and pests are those of cabbage, but rarer.

MUSTARD, TUBEROUS-ROOTED. This is usually called Chinese; its roots are like white turnips, and can be grown and eaten like them.

Soil.—Preferably light and quick.

NASTURTIUM. The common Nasturtium, or Indian Cress, in its tall and dwarf forms (*Tropæolum majus* and *T. minus*) is grown for its buds and unripe seeds, used in pickling, and for its flowers, used in garnishing. Either may be started in the house, best in pots or individual receptacles, as they transplant poorly. Or plant out-of-doors when frosts are past. Tall kinds should be provided with poles or a trellis on which to run; the dwarf support themselves.

Soil.—Light and rich.

Distances.—For the dwarf, one foot by six to nine inches. For the tall, two feet by one.

Depth.—About one inch.

Sow when frosts are past. Or start under glass in April.

Thin or transplant to permanent positions.

Culture.—Give ordinary care.

Pick the flowers as wanted. Pick the seed-pods before they mature.

NASTURTIUM, TUBEROUS-ROOTED, is a tropical or semi-tropical plant grown for its tubers, which in South America are considered a delicacy. It is a perennial plant treated as an annual, and in northern climates propagated by its tubers. In South America the people freeze the tubers after boiling them, by which means the taste is considerably improved. They are usually eaten with molasses.

Soil.—Warm and light.

Distances.—Hills three by three feet.

Depth.—One inch for seed; for tubers, two or three inches.

Sow when frosts are past, four to five seeds to a hill.

Thin to one plant.

Dig when the vines are killed by frost. Keep frost from the tubers, and

Store in sand.

NEW ZEALAND SPINACH. See Spinach, New Zealand.

NIGELLA SATIVA, or Love-in-a-Mist, or Fennel Flower, is a hardy annual sometimes grown for its seeds, used in seasoning. It does not transplant well.

Soil.—Light and warm.

Distances.—Rows one foot or more apart.

Depth.—About one inch.

Sow when the ground is fit.

Thin at three inches to six to eight inches apart.

Pick seeds as they ripen.

NIGHTSHADE, BLACK-BERRIED. Black-berried Nightshade is *Solanum nigrum*, a hot-season plant whose leaves are sometimes used as greens.

Soil.—Light and warm.

Rows.—One foot apart.

Depth.—About one inch.

Sow when frosts are past.

Thin to six inches.

Culture.—Give ordinary care.

Pick the leaves as wanted, or pull the whole plant.

NIGHTSHADE, MALABAR or WHITE (*Basella alba*) is an annual plant of a different family, but also grown for its leaves, used as greens. *B. cordifolia* is used in the same manner.

Soil.—Light and quick.

Distances.—Hills two feet or more each way.

Depth.—About one inch.

Sow under glass in April, or outdoors when frosts are past, three to five seeds to a hill. When well up,

Thin to one plant.

Set out house-grown plants when frosts are past, after hardening.

Pick the leaves as wanted when the plants are well established, but do not strip the plants.

OCA (*Oxalis crenata*) is a South American tuber-bearing-plant, little cultivated in North America. It is grown for its tender leaves and shoots (used like sorrel for salads or greens) but chiefly for its tubers. These, somewhat acid when fresh, turn sweet when exposed to the sun for a few days in woolen bags; when completely dried by this process, they taste like figs. The plant needs a long season and is very tender to frost.

Start the tubers under glass in March, or

Plant outdoors when frosts are past.

Soil.—Light, warm and rich.

Distances.—Three feet by three feet.

Depth.—Two to three inches.

Take cuttings from growing plants, like sweet potatoes.

Culture.—Preserve the surface mulch until the vines cover the ground. Cover the stems with earth wherever they root, and more tubers will be produced.

Dig when the vines are killed by frost.

Dry as above.

OKRA, or Gumbo, or Gombo (*Hibiscus esculentus*) is a hot-weather and very tender plant grown as an annual for its seed-pods, which are picked while tender for use in soups, stews or as a vegetable, or are dried or canned for winter use. Okra is of growing popularity, its mucilaginous effect being agreeable to many, though

known to most only in Gumbo soup. For an early crop it is best started under glass, in pots, because it transplants poorly. The pods, which form early, and very quickly after flowering, should be picked before

Fig. 79. Okra seedlings. Two-thirds natural size.

they develop woody fibers, which spoil them for use; the size of the pods at picking time depends upon the variety. Varieties are several, being chiefly Tall Green, Dwarf Green, and Lady-finger; the first two sub-divide into long- and short-podded, the Lady-finger into white- and green-podded. Types are likely to run together, and only the best seeds should be bought. The varieties best for general use are the Dwarf Green Long-pod and the White Lady-finger; the dwarf succeeds best in the North.

Soil should be light, warm, rich, and in the best of tilth.

Distances are entirely according to the variety. Rows thirty inches to five feet apart, plants in the row

twelve to thirty inches. Or plant in hills, two by two feet to three by three feet, and thin to two or three plants in the hill.

Fig. 80. Okra. Dwarf plant of a long-pod variety.

Depth.—One to two inches, according as the soil is firm or loose.

Sow for an early crop under glass in April, in pots, and repot as the plants grow. Sow outdoors in late May or early June, when frosts are past, thinly in the row, eight to ten seeds in the hill.

Set out house-grown plants when frosts are past.

Thin when the plants are growing well. Taken up with care, thinnings may be transplanted.

Culture.—Preserve the surface-mulch.

Fertilize while the plants are young, with two or three applications of nitrate of soda or liquid manure, a week apart.

Cut with an inch of stem while the pods are tender; if they are too tough to slice with a kitchen knife, they are too old. The flowers open early in the morning, fade in a few hours, and the pods are usually ready to pick on the afternoon of the next day. The sizes of the pods vary with the varieties. Pick clean daily; otherwise the plant suspends production for a while. Pods may be kept fresh by moistening and spreading thinly on trays in a cool place. They heat in bulk, or in a closed receptacle.

PLATE VI. Dwarf Okra—Flower, Leaves, and Two Pods

Uses are chiefly in soups, but Okra, when boiled, is excellent served hot or else as a cold salad. Some persons have to acquire the taste. For various recipes, see Farmers' Bulletin No. 232.

Okra may be canned, or may be dried and kept for winter use. To dry, string and hang up. In the South the mature seed is sometimes roasted and ground for use as coffee.

Do not cook in iron, copper, or brass, or the pods will be discolored and perhaps rendered poisonous.

Diseases, not mentioned in Farmers' Bulletin No. 232, are elsewhere reported as so troublesome that the plant cannot be grown in some localities. Rotation is given as the remedy.

Pests are not dangerous.

OLD MAN. See Rosemary.

ONION (*Allium Cepa*) is the chief of a very important vegetable family, and has been grown from antiquity for its bulbs, used for seasoning and cooking, for pickling, and for eating raw. It is a biennial and in some of its forms a perennial plant, and is grown as an annual or a biennial. Onions are propagated from seed (which should always be of the very best), from bulbs, from parts of compound bulbs, and from "tops," or bulbs formed on the tops of the flower-stalks. Growing from seeds require the best of physical condition

for the land, as the seeds germinate very slowly, and the best of surface tillage, as the young plants are easily killed by weeds. The old style of onion-bed is now universally discarded for culture in straight rows, and in Onion culture more than in many others the wheel-hoe and mechanical planter are of great use. But hand-weeding is necessary, especially when the plants are young, and thinning also requires hand work. The Onion is very hardy to frost, and is somewhat tender to heat; therefore, the seed is always sown as early in the spring as possible, in order to have the plants well growing by midsummer. In mild climates, for the same purpose, seed is sown in the fall. From spring-sown seed the fall crop is gathered; for earlier Onions "sets," "tops," or "potato onions" are set out. These are all bulbs grown by one method or another, "sets" being bulbs arrested in their growth and stored for spring use, "potato onions" or "multipliers" being compound Onions of which the parts or bulbels are planted separately. Each bulbel will produce a compound bulb. "Tops" or bulblets are described above. There are several varieties of top-onions and potato-onions, while sets may be grown, as described below, from the seed of any variety, though the results vary.

Fig. 81. A modern Onion field. Except for early weeding, it can be cultivated with wheel-hoes.

Seed is never grown from sets, as the results would probably be inferior. Varieties of Onions are classified according to methods of propagation, as above, or by shape (round, flat, oval and top-shape) and color (red yellow, white). Some varieties are very large. Diseases and pests are troublesome.

Soil for Onions, since an early start is essential for an early crop, is best prepared in the fall by plowing, leaving the ground rough through the winter. For a late crop the ground may be prepared when the spring opens. The soil should be moist but well drained, rich, and "quick." Fresh or rough manure should not be used on Onion land, but well-rotted manure may be worked in, and should be supplemented with surface dressings of commercial fertilizers and wood-ashes, lightly worked in, since Onions are chiefly surface feeders. Onion ground should not be light or loose, as the bulbs develop better on a firm surface. The preliminary surface cultivation should be kept up until the time of planting, to conserve the moisture and kill all the weeds.

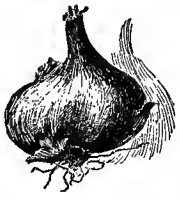

Fig. 82.
A multiplier Onion.

Fig. 83.
A multiplier Onion in cross-section, showing its divisions.

Commercially, the choice of Onion land is of the greatest importance. Clay lands are too hard to work,

are too moist, and are usually lacking in humus; they are, besides, "late" and require the greatest care in cultivation. Sandy lands are too dry and porous. Stony or gravelly soils cannot profitably be worked. A medium loam, rich and deep, is best; it should be as level as possible, since sloping soils wash, exposing some bulbs and covering others. Underdraining often pays, and many acres of former muck land are now in paying use. Previous cultivation of heavily manured hoed crops will usually get the soil in perfect condition. Onions are often grown year after year on the same land, by freely fertilizing, unless diseases or pests force a rotation.

Distances are somewhat according to the variety of Onion used, the method of culture, and the age at which they are to be pulled. For ordinary culture, rows a foot apart or even less, and the Onions about three inches apart in the rows, is enough, unless the Onions are to be pulled when small, when they may stand two inches apart. The very large varieties, transplanted from the hotbed, may need six inches space in the rows, which should be fifteen to eighteen inches apart. For horse-culture, the rows should be thirty inches apart.

Depth.—Sow seed one-half to one inch, according as the soil is compact or loose. Set young Onions as they grew in the seed-bed. Set sets, tops, or multipliers with their tops just showing.

Sow under glass in March or April. Outdoors, sow seed in mild climates in the autumn, for an early start, or as soon as the ground is fit in spring. Have no seed but the best, and *sow thickly!* Plant sets, etc., when

Fig. 84. Onion seedlings. Natural size.

the ground is fit, and once more in a fortnight for succession; in mild climates they may even be set in the fall.

Thin the rows when the plants are three inches or more tall. If the young Onions are to be used, thin to

one and one-half inches, and when about the thickness of the finger pull the intermediate plants. They are eaten raw or used in salads.

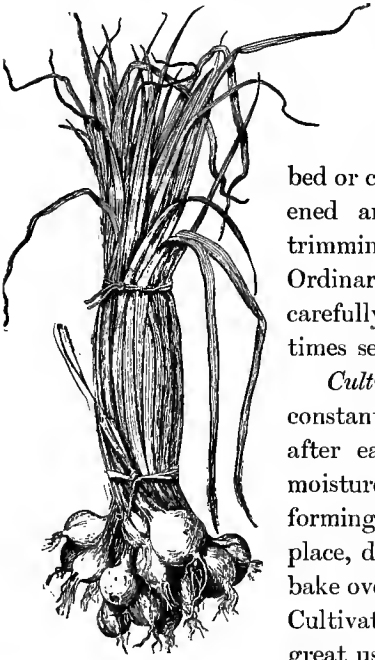

Fig. 85.
A bunch of early Onions.

Transplanting or Setting Out. — Transplant young Onions from hot-bed or coldframe when well hardened and the ground is warm, trimming both tops and roots. Ordinary thinnings, if pulled carefully and cut back, are sometimes set in other rows.

Culture of Onions should be constant, the soil being stirred after each rain to preserve the moisture, and to prevent the forming of a crust. In the first place, do not allow the earth to bake over the seeds, after sowing. Cultivation with a wheel-hoe is of great use in the Onion plot; the straddle-row cultivator may be used until the plants are very large. But hand-weeding among the plants is always a necessity, and may be done at thinning-time and whenever the weeds grow large. A good deal of this labor may be avoided by using very well-rotted manure, and by putting the crop on land

that has previously had clean culture. Cultivation should begin as soon as the rows are visible, if the weeds are at all numerous; if the planting machine has been used, the mark of its roller will usually allow cultivation even before the plants appear. If the Onions are transplanted, the wheel-hoe should at once be used to loosen the packed soil. Cultivation, except at first, should not be deep, on account of the danger of injuring the roots. The earth should always be kept away from the bulbs.

Fertilizer.—Onions use up all three of the chief elements of plant-food, which should be generously supplied, as Onions require a much greater quantity of food than most other crops. Manure may be applied in great quantities in preparation of the land, some growers using from forty to seventy-five tons per acre; it should always be supplemented by potash and especially by phosphoric acid for best results. After-fertilization should be by chemicals; wood-ashes, unleached and preferably of hard wood (six to eight tons per acre), will supply potash as well as improve the physical condition of the soil. Or use potash salts in fall, winter or early spring, 200 to 300 pounds muriate potash or 800 to 1,000 pounds kainit, per acre. Bone-meal or other phosphates, 300 to 400 pounds per acre, will give phosphoric acid. Nitrate of soda should be given in four equal dressings (the first just before planting)—200 to 400 pounds per acre. All of these

commercial fertilizers should be lightly worked into the soil. For ordinary garden culture a good mixed fertilizer, liberally supplied early in the season, and followed by occasional dressings of nitrate of soda or waterings of liquid manure, will be enough.

At the same time it should be mentioned that experiments show that applied in large quantities fertilizer may be wasted. "The onion-grower runs great risk of diminished profits when he uses 1,500 and 2,000 pounds of [high-grade] commercial manure per acre." (Farmers' Bulletin No. 149.)

Harvesting.— Onions usually show their ripeness by the dying of the tops. When most of the plot have begun to turn yellow, if the others are still green, break them down by rolling a barrel along the row or by twisting them by hand. This should be done if the whole crop remains green well into September. When the tops are dead, pull the crop, laying the Onions so that the sun shall reach their roots, in windrows or in heaps. On account of the danger of rain, they are best cured under cover. When dried, the tops are cut off an inch or less from the bulb, and they are then stored. Sometimes the tops are cut off before the crop is pulled, and occasionally the tops are allowed to remain and the Onions are tied together by them.

Storage is usually in boxes or barrels out of the reach of frost. Commercial storage is not treated here. Onions may be frozen if they are not again thawed till

spring, and not handled while frozen. Storage without loss is rare.

The "New" Onion Culture.—This is a method introduced into this country in 1889, but previously practiced in Europe. As already indicated, the Onions are started under glass in February or March, and set out when the ground is warm. The transplanting seems to benefit the plants, and the crop is always larger and more uniform in size. In the South the plants are started in seed-beds in the open; in the North the expense of sashes and labor is likely to be prohibitive, except in garden culture. In setting out the plants both tops and roots are cut back. Sow thickly, and water till the plants are up; if they crowd, thin.

Sets are grown by sowing the seed of a given variety broadcast and very thickly on a plot of sandy ground. The plants, after well starting, presently stunt each other. When the tops die, pull, dry, and store. The sets should be less than an inch in diameter. Small Onions from the previous season's crop are not successful as sets.

Top onions are grown from their bulblets,

Multipliers from their bulbels. Neither seed readily.

Seed should always be the best, regardless of expense, as poor Onions are not worth growing.

Scullions or Scallions are Onions which, from poor seed or improper conditions, do not bulb but have a thick neck.

Diseases.—Smut may be entirely prevented by growing the Onions in hotbeds and transplanting—an argument for the New Culture. Otherwise, sow in the drills sulphur (one-hundred pounds per acre) and air-slaked lime (fifty pounds per acre) with the seed. One ounce of the mixture equals fifty feet of drill. Special seed drills may be made for the purpose. See New York Bulletin 182. Rotation helps somewhat, but not entirely, and it will also help on smutty land to sow more seed. For rust use rotation; spray with copper fungicides, while the plants are young; destroy affected plants.

Black mold.—Spray with Bordeaux.

Pests.—Onion-fly or onion-maggot eats into the bulb and roots of the plant while young. Sprinkle the earth and the plants with carbolic acid emulsion (one to thirty) as soon as the plants are up, and at weekly intervals while there is danger; or inject carbon dioxide into the ground around them, a laborious process. Apply tobacco dust freely alongside the plants; this, besides repelling the fly, will feed the Onions. Rotate, and feed highly; burn all injured plants, and all rubbish of the patch. See also cabbage-maggot treatment. For Onion cutworms dry bran and middlings in equal parts mixed with one-thirtieth of their weight of Paris green, is very effective. Scatter along the rows and around the edges of the plot. Thrips, which attack the leaves, do great damage. Spray with kerosene

emulsion, (one to ten), resin wash, tobacco water; drench with cold water.

ONION, CANADA, or

ONION, EGYPTIAN, is

ONION, PERENNIAL. Perennial, Tree, or Canada Onion, sometimes called Egyptian Tree or Top Onion, is *Allium proliferum*, a plant of the Onion family whose root bears no bulb but has several offsets, and whose top bears bulblets. Its tops are often used as small Onions for pickling, or to reproduce the plant. This is more usually done, however, by means of the root offsets, which are set separately, usually in the fall, the resulting plants being used in spring as scallions or leeks. Set in the fall, Perennial Onions are among the earliest-yielding plants of the garden. Actual perennial use of the plants is rare, yearly planting being usual.

Soil.—Any good garden soil, preferably light, quick, and in good tilth.

Distances.—Rows one foot apart, bulbs three to six inches in the row.

Depth.—Lightly cover the tops of the bulbs.

Sow.—Set the root offsets in the spring, or preferably in fall, in late September or early October. Set the tops in spring, when the ground is fit.

Culture should be clean and frequent.

Pull the plants as wanted, when of sufficient size; or allow them to grow and make tops.

Protect lightly over severe winters.

ONION, TREE, See Onion, Perennial.

ONION, WELSH. Welsh onion, or Ciboule (*Allium fistulosum*), is a perennial plant of the Onion family which does not bulb, and is grown for its leaves, used in seasoning, giving a mild onion flavor. There is also a Perennial Welsh Onion (*A. lusitanicum*), the difference between the two being that the ordinary may be propagated from seeds as well as root divisions, while the perennial cannot be raised from seed, as it produces none. Both are hardy to frost, but will not always withstand a severe winter. Varieties of the Welsh Onion are red and white.

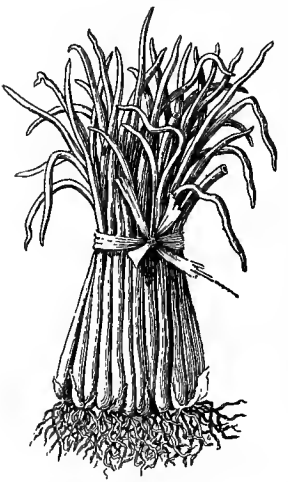

Fig. 86. Welsh Onion.

Soil.— Any good garden soil, preferably cool and moist.

Distances.—Set the divisions, or sow the seed, in rows a foot apart. Divisions, six inches apart in the rows.

Depth of seed, one-half to one inch; of divisions, as before.

Sow the seed when the ground is fit; in mild climates it may be sown in the fall. Set root divisions in spring.

Thin when seedlings are four to six inches high, to six inches apart in the rows.

Culture should be clean.

Pick the leaves when the plants are well established; cut for use as wanted.

Protection is necessary in northern winters; give a mulch of hay, straw, or leaves.

Use the leaves in seasoning, stripping off the dry outer coats.

OPIUM POPPY (*Papaver somniferum*) is the annual plant from which opium is obtained, but grown for use in domestic medicine as yielding from its capsules a decoction used as a sedative or an anodyne application. Its seeds are occasionally used in cooking. It comes in two varieties, the carnation-flowered and peony-flowered.

Soil should be light and quick.

Distances.—One foot each way.

Sow in mild climates in fall. Otherwise sow when the ground is fit. Or sow under glass in pots, and set out. Successive sowings are possible until June.

Gather the capsules when ripe.

ORACH, often called French or Mountain Spinach (*Atriplex hortensis*), is an annual plant grown for its leaves, which are used like spinach, and sometimes cooked with sorrel. It is tender to heat and quickly runs to seed in midsummer, when its value as a pot-herb is gone; the flower-stalk should therefore be pinched off as soon as it appears. Being hardy to frost, it should be sown as soon as the ground is fit, for an early crop, and monthly for succession. Varieties are green, red, white, and copper-colored, of which only the red and white are usually offered in America, though the green is recommended strongly.

Soil.—Any good garden soil.

Distances.—Drills, two feet apart.

Depth of seed, one-half to one inch.

Sow as soon as the ground is fit, thinly.

Thin when well up, at about six inches, to one foot in the rows. Or

Sow in seed-bed rows one foot apart, thin to two inches, and transplant to one by two feet.

Pick all seed-pods before they ripen, or the plant will seed itself and become a pest.

Pick the leaves as they are wanted.

Succession.—Sow in April, May and early June, and again in August for a fall crop.

OYSTER PLANT. See Salsify.

OYSTER PLANT, SPANISH. See Scolymus.

OYSTER, VEGETABLE. See Salsify.

OXALIS. See Oca, also Wood Sorrel (under S.)

PAK-CHOI, or Chinese Cabbage (*Brassica sinensis*), is like Pe-tsai, but does not head. It is grown for its leaves, used for salads or greens, or the midribs may be

Fig. 87. Pak-Choi.

served like asparagus. Pak-choi matures in about six weeks, but bolts in heat, and is best sown in late summer for a fall crop. Otherwise its management is

much like that of Chard, which see, under its management.

Soil.—Rich, cool, moist.

Distances.—Rows eighteen inches to two feet apart.

Depth.—One-half to one inch.

Sow in late July or August, where the plants are to stand, and thin, as with chard.

Pick when the leaves are twelve inches or more tall, and before the seed-stalk appears.

Fig. 88. Seedlings of Parsley. Natural size.

PARSLEY. (See also Parsley, Turnip-rooted.) Parsley (*Carum Petroselinum*) is a hardy biennial plant, grown for its leaves, used in garnishing and seasoning, and occasionally in salads. It is a plant of extremely slow germination, requiring four to five weeks, and is difficult to grow (under certain and not very well-understood conditions). Once established it does well, and if not too heavily cropped will continue to yield steadily until it flowers, when its value is lost. Parsley may be kept

outdoors over the winter in a frame, or may be taken into the house to be picked all winter. Use curled or fern-leaved varieties; the common is too much like the Fool's or Poisonous.

Fig. 89. Parsley plant.

Soil should be a good, deep, medium, garden earth, well tilled.

Distances. — Rows one foot apart. Plants eight to twelve inches in the row. On very fertile land, allow eighteen by twelve inches to each plant.

Depth.—One-half inch.

Sow under glass in March or April; transplant into pots, taking care not to break the taproot. Set out when well hardened and the ground is fit. Or

Sow outdoors when the ground is warm, thickly, and do not allow the earth to bake over the seeds, or to dry out. When well up, thin or transplant. Seed-bed culture will give the best results, and the plants should not be allowed to crowd.

Fertilize from time to time with nitrate of soda or liquid manure.

Pick the leaves as wanted, never all at one time, when the plants are well established, usually not before three months from seed. Cut off flower-stalks to prolong the yield.

Succession.—Sow for succession in June, and for

young plants to carry over the winter under glass, in August.

Protect in the open under glass. Or mulch.

Pot some of the plants for the house. They do well in any warm window.

Diseases and *pests* are chiefly those of Parsnip and Celery, which see. Against the parsley-worm use hellebore or pyrethrum rather than arsenites.

PARSLEY, HAMBURG. See Parsley, Turnip-Rooted.

PARSLEY PERT. See Samphire.

PARSLEY, TURNIP-ROOTED, or Hamburg, is a variety with large parsnip-shaped roots, for which the plant is cultivated. The flavor is something like Celeriac, and the plant is cultivated like most root-crops. The roots will stand the early frosts, but like carrots should be taken up and stored in sand for winter use.

Soil.—Any good garden earth, preferably rich and cool, not freshly manured.

Distances.—Rows a foot apart.

Depth.—About one-half inch.

Sow thinly in the rows when the ground is fit, or in mild climates sow in the fall. Plants mature in about three months from sprouting.

Thin early to six to nine inches in the rows. Transplant thinnings.

Dig spring-sown roots after the early frosts. Dig fall-sown in early summer.

PARSNIP (*Pastinaca sativa*) is a biennial plant, grown from seed for its thick roots, used as a vegetable, and in soups and stews. It is a long-season plant, requiring the ground from early spring till fall; it is

Fig. 90. Parsnip seedlings. Two-thirds natural size.

very hardy to frost, and the roots may be left in the ground through the winter, many supposing that they are improved by the freezing, though Bailey claims that this is an error, since all they need is to be kept from shriveling. As Vilmorin-Andrieux says, when stored under cover they sometimes get "spongy and strong-flavored." Therefore store in sand, or leave in the ground till wanted. Parsnips require deep ground, not recently manured, but rich; as the seeds are slow to germinate, the ground should not be allowed to bake over them. Once the plants have covered the ground

with their foliage, they need no further attention. Varieties are short (or round), medium, and long. Diseases and pests are not troublesome.

Fig. 91. Parsnip.

Soil for parsnips should be cool, moist, rich, and deep. It should not bake over the seeds, and at the time of planting must be deeply tilled, that the roots may go deep and straight and not be forced to branch. A high or a hard subsoil is detrimental to Parsnip. The soil should not have been recently manured, but may be well enriched with commercial fertilizer.

Fig. 92.
Long Parsnips.

Distances.—Rows, eighteen to twenty-four inches apart.

Depth.—One-half to one inch.

Seed should be fresh, as it loses in germinating power after the first year. For this reason, and because it sprouts slowly.

Sow thickly, as soon as the ground can be worked.

Thin when well up, to six to nine inches.

Culture.—Weed and cultivate until the leaves cover the ground.

Dig in the fall, as needed, and before the ground freezes store the winter supply in sand in the cellar, or in pits. The rest, if left in the ground, will be good in spring.

Pests.—For Parsley-worm and Web-worm use arsenites; apply early as soon as they appear.

PATIENCE, or PATIENCE DOCK. See Sorrel.

PEA (*Pisum sativum*). Peas are hardy annual vegetables, of short season and somewhat tender to heat, in which they are likely to fail and mildew from lack of moisture. In America they are almost exclusively planted outdoors where they are to grow, but in England and Europe they are frequently either grown entirely under glass, or started so and transplanted to the field. If this is done in early spring, coldframes are probably the best, as Peas are sensitive to heat. It appears from Vilmorin-Andrieux and Nicholson that in France and England Peas may be sown outdoors in the autumn for an early spring crop, but that is never done in America, as in our long winters the seed would spoil. Management of Peas is largely with us a question of type, Peas classifying into smooth- and wrinkled-seeded,

and again into dwarf, half-dwarf, and tall, which are practically early, medium, and late. The smooth-seeded are the earliest and hardiest, but the wrinkled-seeded are of better quality; the dwarfs of both are their earliest. Among vegetable gardeners the smooth-seeded Peas are not in favor except for the earliest crop; after that it is possible to get the wrinkled-seeded on vines of

Fig. 93. Pea seedlings. Two-thirds natural size.

all heights, the taller the more prolific. Dwarf Peas do not need to be supported; the half-dwarf and tall should be supplied with brush or chicken-wire to climb on, set at the time of planting. For economy of space Peas are usually planted in two rows close together, the support between; dwarf Peas thus planted will support each other. Late planted Peas should be put in deep, for the sake of moisture; it is well to plant in a trench and fill in as the plants grow. The soil for Peas should not be very rich; for early Peas it should be light, for

later heavier. Coarse manure is best not used on pea land, unless trenched in in the foreign fashion; but a little nitrate of soda or liquid manure may be scattered on the land to give a quick start. Varieties are very numerous, within the types above given; for uniform results, buy only the best seed. Diseases and pests are sometimes troublesome.

Fig. 94. Whole plant of dwarf Pea.

Soil.— Besides the remarks above it may be said that advance preparation of the soil is advisable for Peas, and that they are best grown on land which in a previous year has been well enriched. The nitrogen applied to the soil before sowing is not necessary if the soil is known to have the nitrogen-gathering bacteria: once the plants have got well started they will gather their nitrogen from the air. In fact, too much or too fresh manure, or an over-supply of nitrogen, will make the plants run to vine, in which case they will have to be persistently pinched back.

Soil-inoculation of nitrogen-gathering bacteria (see Bulletin No. 71, Bureau of Plant Industry) is possible and under the right circumstances effective by means of cultures which can be obtained of the Bureau of Plant Industry, Washington, D. C. Or buy of private firms, whose product, however, is not always good.

Distances are according to variety. Planting in double rows, six to eight inches apart, is recommended for all kinds of Peas. Spaces between the double rows should be eighteen inches to four feet, according to to variety.

Depth is somewhat according to season, but also to the nature of the land. Early Peas in heavy land may go one inch deep; in light land about two inches. Later in the season plant two to three inches and in June sow in trenches five to six inches deep, and fill in as the plants grow. In porous soil plant deeper, in heavy land more shallow.

Seed should be sowed thickly for the early crop, for the later about one-half to one inch apart, the dwarfs the closest together. Soak the seed after the ground is warm.

Sow smooth Peas as soon as the ground can be worked in spring. Peas and onions are the earliest to be sowed. Sow wrinkled Peas when the heavy frosts are past, about the middle of April. From that time on, sow every ten days for succession until early June. Sow again in August, early varieties for a fall crop.

Thin to three to four inches apart in the row.

Cultivation should be shallow, to preserve the moisture of the ground and not to injure the roots. Pinch off the ends of the vines if they grow too rank; if the ground is much too rich this must be done repeatedly.

Pick the pods as they fill out, whether needed or not, to lengthen the yield.

Support.—Devices are numerous, brush, string, and chicken-wire being the most common.

Protection from birds is frequently necessary with Peas. Use mosquito netting for absolute protection, or hang strips of cloth or tin above the rows.

Forcing.—For forcing, the dwarf varieties are best.

Diseases.—Mildew is likely to come in summer. Spray with fungicides, mixed with soap to make them adhere; or use powders, such as fostite (Lodeman) when the vines are wet. Against blight-fungus, use healthy seed, keep vines from ground, spray with Bordeaux.

Pests.—The pea-weevil lays its eggs in the young pods, and the larvæ live in the Peas. Sow with the seed sand or coal-ashes saturated with carbolic acid. Treat affected seed as soon as picked, with bisulphide of carbon in a tight receptacle, or heat to 140° Fahr. for an hour. Destroy all waste seed, and buy only the best. Plant late; or hold seed over for a year in a tight bag or box.

Pea-louse.—Brush from the vines, and cultivate,

Spray with whale-oil soap, one pound in six gallons of water.

Moth.—Pick the pods while young, and let none ripen; rotation. Destroy vines; plow in fall.

For blister-beetles and other pests which injure beans, see under Bean. For plant-lice, plant-bugs, and leaf-hoppers, underspray with kerosene emulsion.

For caterpillars, hand picking, arsenites (wash before shelling). For cutworms, bait as under cabbage.

PEA, EDIBLE-PODDED or SUGAR, is a type of pea with tender pods, which are eaten exactly like string beans, and are much esteemed in Europe. They should be better known in America. Their culture is like other peas, according to the sizes of the vines, dwarf, half-dwarf, and tall. The peas should be picked before they ripen.

PEA, WINGED, is a prostrate annual plant of the pea family of little apparent value, the pods eaten like Sugar Peas, or the seed, when ripe and roasted, ground as a substitute for coffee.

Sow when the ground is fit, in rows eighteen inches apart.

Depth.—Two to four inches, according to soil and season.

Thin to four inches apart in the rows.

Soil as for other peas.

PEANUT (*Arachis hypogœa*), often called Ground-nut, Earth-nut or Goober, and sometimes Ground-pea, Manila-nut, Jur-nut, and Pindar, is an annual leguminous plant grown for its "nuts," which are really peas. The peculiarity of the plant is that after flowering the stalks thrust themselves into the ground and ripen there, dying within a few hours if they are unable to penetrate the ground. The Peanut plant is very tender to frost, and is not grown with success north of New Jersey, except as a curiosity giving a small yield. Commercially the plant is of great importance in the South, and still more so in other semi-tropical parts of the world, chiefly for the sake of its oil and meal. It makes an excellent forage-crop. Varieties are the Virginia (Running and Bunch, or White and Red), Tennessee (White and Red) and (smaller varieties), the Georgia (Red), North Carolina (or African) and Spanish. The Virginia and the Tennessee are the most grown; the Spanish has small kernels of good quality, and brings the highest prices.

Soil.—All varieties except the Spanish require a calcareous soil; if lime is not present the plants produce a large proportion of "pops," or shells without seeds. The Peanut will give heaviest yields on stiff land, but commercially the crop thus produced is of little value, as the pods are stained, making them unmarketable. Light soils give light-colored pods, which are in demand. In the North light soils should

be used on account of earliness. The Spanish will "make profitable returns wherever the cowpea will succeed." (Arkansas Bulletin No. 84.) The soil should be finely pulverized before planting. Light dressings

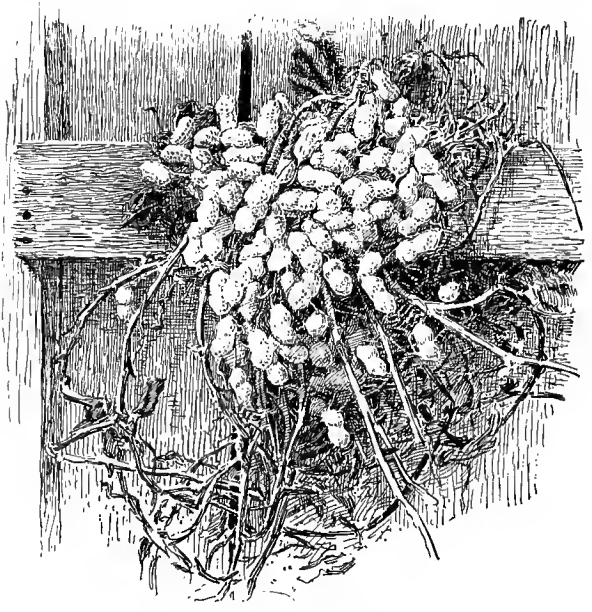

Fig. 95. Peanuts, drying.

of barnyard manure may be previously ploughed in, and lime (of any kind if well burned), phosphoric acid (best as fine ground phosphatic slag, or superphosphate on heavy land) and potash (best as kainit) may be previously applied in the furrow or broadcast after

planting and cultivated in. Use lime at the rate of 30 bushels per acre, or marl at 100 to 150 bushels per acre, if there is plenty of humus in the soil; otherwise apply in smaller quantities, adding also humus from year to year. By proper rotation, Peanuts will assist to continually improve the land, since they gather nitrogen from the air, and store it in the ground. But in most of the Peanut sections the soil has been impoverished by a too steady drain upon it.

Distances are chiefly according to variety, though the fertility of the land should be considered. Rows from two to three and one-half feet apart; hills in the row, six inches to two feet. The Virginia are usually grown eighteen by thirty-six inches; the Spanish, six by twenty-four inches.

Depth.—About four inches.

Sow when frosts are past, in the North about June 1, two seeds to the hill. Or start under glass in pots in April, and set out when frosts are past.

Seed is best shelled, taking care not to break the skin of the kernel. The Spanish, however, is frequently planted in the shell, which is merely broken in two.

Culture should be level; it is a mistake to hill. The chief object is to keep down weeds and preserve the surface-mulch until the vines cover the ground.

Dig before frost, which will injure the nuts.

Dry the nuts carefully, and store in bags away from frost and moisture.

PENNYROYAL (*Mentha pulegium*) is of the Mint family, and is cultivated exactly like Mint, which see.

PEPPER or CAPSICUM (*Capsicum annuum*) is a hot-season plant which will endure some frost, but for best results in the North should be started under glass.

Fig. 96. Seedlings of Pepper. Natural size.

The plants are grown for their fruit: that of the small varieties is used for pickling; that of the larger is used for "mangoes" and "stuffed peppers." The larger varieties bear large fleshy fruits of a mild or even sweet flavor; the small peppers, especially the so-called Chili Peppers, are hot and peppery, although quite distinct, botanically, from the Pepper of commerce. Varieties differ in shape, size, and pungency. "Green Peppers" are the unripe fruits.

Soil should be light, warm, and rich, but not dry.

Distances should be somewhat according to the size of the variety, from one foot by two up to thirty inches by eighteen.

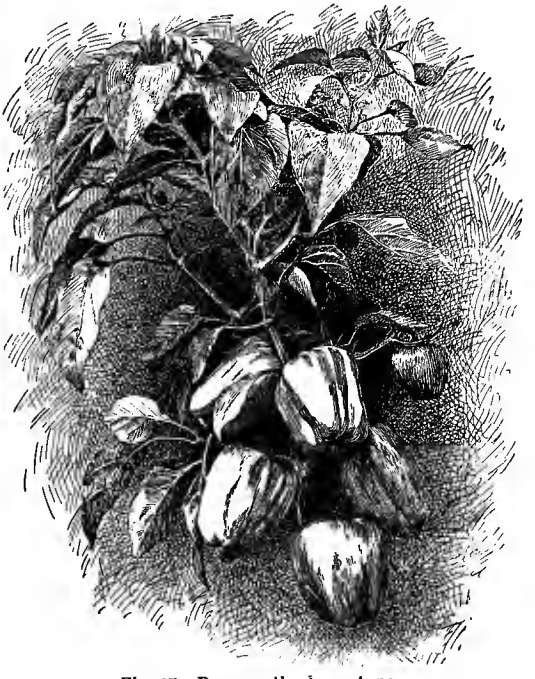

Fig. 97. Peppers, the large type.

Depth.—One-half to one inch.

Sow under glass in March, and prick out, preferably into pots. Sow outdoors when frosts are past, about

the end of May, in hills or drills. Three or four seeds to the hill. Or sow in sheltered seed-bed and transplant.

Thin seed-bed rows at the fourth leaf, to three inches. Thin hills to one plant.

Set out house-grown plants when frosts are past, after hardening.

Fig. 98. Young Pepper plant, ready for setting out-of-doors.

Transplant with plenty of earth, at five or six inches.

Culture.—Give clean cultivation. Large fruits may be grown by pinching off all blossoms after the first few fruits have set, and by cutting back the ends.

Support.—It is well to tie the plants to stakes in the case of a heavy crop. Earthing the stems is not so good.

Pick at about twenty weeks from seed, until frost. Cut the fruit with an inch of stem, and do not tear it from the plant. If the hands are burnt while handling Peppers, soothe with milk.

Diseases.—Anthracnose (pink and black) may be partly controlled by Bordeaux.

PEPPERGRASS. See Cress.

PEPPERGRASS, CALIFORNIA (*Brassica Japonica*), is grown as a pot-herb for its leaves. It often runs wild, and deserves to be better known. Cultivate like spinach or collards.

PEPPERMINT. See Mint.

PE-TSAI, or Chinese Cabbage (*Brassica Pe-tsai*), is a plant of the cabbage family, grown for its head of leaves, which much resembles a head of Cos lettuce, but is usually boiled as a pot-herb. As it bolts in heat, it is best sown in late July or August, for a fall vege-

Fig. 99. Pe-Tsai, or Chinese Cabbage.

table. It will stand frost. Varieties are few; pests are those of the cabbage family.

Soil.—Any good garden soil, preferably cool and moist.

Distances.—Eighteen by twelve inches.

Depth.—One-half to one inch.

Sow thinly in late July or August, and thin in the rows, or sow in seed-bed and transplant. Thinnings may be transplanted.

Pick before the plant goes to seed, which it does quickly in hot weather.

PICRIDIUM VULGARE is the name given by Thompson to French Scorzonera, which see, under S.

PIE-PLANT. See Rhubarb.

PIGWEED, or Lamb's Quarter (*Chenopodium album*), is sometimes grown in gardens as a pot-herb. Treat like spinach. (The name Pigweed is also applied to the green amaranth, *Amarantus retroflexus*, a common barnyard weed.)

PIMPINELLA, or Pimpernel, or Burnet Saxifrage (*Pimpinella Saxifraga*), is a plant grown for its leaves, used in salads, having a cucumber flavor. It is little used. Culture is like that of Anise, to which it is allied.

PINDAR. See Peanut.

PLANTAIN. See Bucks-Horn Plantain

POPPY, OPIUM. See Opium Poppy.

POTATO (*Solantum tuberosum*), often called White, Common, or Irish Potato, is grown for its root-enlargements, or tubers. Although unknown to civilization until the sixteenth century, the potato is now one of the most important crops in the world. A perennial plant in its native valleys of Mexico and South America, it is grown as an annual, being tender to frost; the tubers are injured by freezing. Success with the potato requires several proper conditions, the chief being the soil and its preparation, the seed, the culture, and the means taken to check disease and kill pests. The soil should be neither dry nor wet; it should not be infested with scab, for which reason also it should not have been recently dressed with fresh manure; it should be rich. The seed should be good, preferably northern-grown, from the most vigorous-growing plants and free from scab. Culture should begin early and not cease until the plants shade the ground. Early and repeated spraying is necessary to ward off blight and insects. Careless, ignorant, or haphazard methods, so usual with our farmers, are fortunate if they bring success, and the amateur, well read in experiment-station literature, can often beat the farmer at his own game. At the same time experience is necessary for steady success with potatoes, and knowledge of the fertilizing requirements of each individual plot is needed to produce good results economically. While the following advice is for garden rather than farm conditions, its lessons are

drawn from federal and state experiments on a large scale.

Varieties of Potatoes are, historically, almost innumerable; for practical use they are early, medium, and late. New varieties are rarely maintained, and the amateur or beginner will be wise to buy a variety locally well known and successful, rather than buy at high prices a novelty which may not have been sufficiently tested. Experiments are now under way at many stations, to produce or find disease-resistant varieties.

Potato crops are usually early and late, though for the garden a third crop is easily obtained, by starting under glass. Earliness is partly a matter of variety, but may be helped by sprouting the seed-piece, using "quick" fertilizers, and by planting on early land prepared in the previous fall.

The worst insect enemy of the potato is the beetle or potato-bug. The worst diseases are scab and the early and late blights.

Soil.—Soil should first of all be free of scab; good potatoes cannot be grown on infested land. If potatoes or beets known to have scab have been grown on a given plot, it must be given to other crops for several years before Potatoes can safely be grown on it.

Potatoes require a deep and moderately light or sandy loam, well supplied with humus, and with an open subsoil. If the soil is heavy, the tubers cannot so easily enlarge; if clayey, the ground will be too wet;

if light and with little humus, the ground will be too dry; if the subsoil is hard, there will be poor drainage, and the roots, which sometimes penetrate to a depth of four feet, cannot go so deeply as they should. Soil

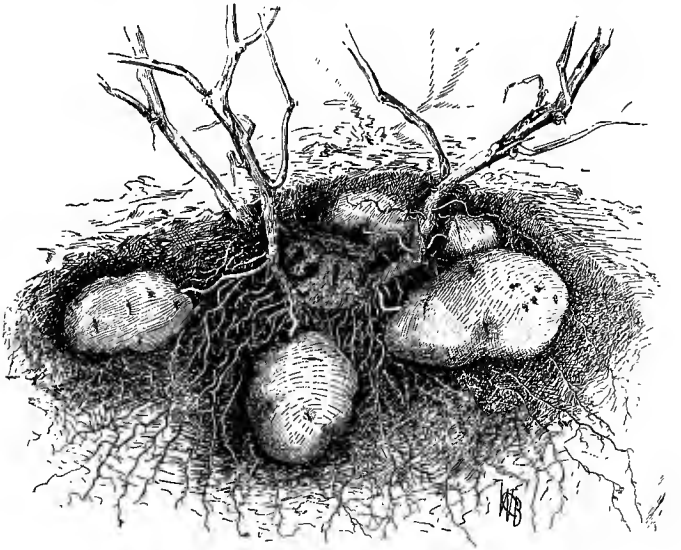

Fig. 100. A hill of Potatoes in stiff soil. The tubers are too near the surface. The old-piece is at *A*.

which with good surface-cultivation will keep its moisture through a dry spell and which in a wet season will not hold standing moisture is best for Potatoes. If there is a choice of soils, sow early Potatoes on the lighter, the main crop on the heavier.

The soil should be rich. Humus, if supplied in the

year the Potatoes are grown, may come from good compost or very well-rotted manure. If fresh, the manure may cause scab. For safety, the manure is best supplied in the fall, and ploughed in; or it could be heavily fed to the previous crop. Or in farm operations green manure (leguminous crops), ploughed in, will both give humus and help to open up the subsoil.

Chemical fertilizers may previously be applied at the rate of about fifteen hundred pounds per acre. If the Potatoes are grown on a large scale, a special study of the needs of the soil is advisable. (See Texas Bulletin No. 71). For smaller operations a high-grade fertilizer may be used, rich in potash. This should be applied down the rows and well covered or worked into the soil before the Potatoes are planted.

Over-feeding, either with manure or with chemical fertilizers, is not advisable, as too rank a growth of foliage invites blight.

The soil should be in the best of physical condition.

Sod-land (grass land freshly turned), lightly dressed with well-rotted manure and with about one thousand pounds of fertilizer, is good for potatoes.

Seed, like land, should be free of scab. It should be of the very finest. Northern-grown seed, especially that from Maine and Vermont, is considered the best. (Seed is here used in the sense of seed-piece. Actual potato-seed is never used except by experimenters for new varieties.)

The seed-piece.—Many experiments have been made, to ascertain the proper size of the seed-piece. Each Potato has a seed or a bud end, which sprouts early and has the most eyes; and a butt or stem end which is slow to start, and which is rejected by many growers. It has been proved that the size of the piece, rather than the number of eyes on it, is of importance in giving good results; consequently, whole Potatoes have been shown to give the largest yield both of salable and small Potatoes. If used whole, moderate-sized, rather than very large or very small Potatoes, are the best to use for seed.

Fig. 101. A good potato cutting, or seed-piece.

But the expense of planting whole tubers is so great that practically to plant half or quarter pieces is wiser, except for small areas. All pieces should be chunky, and not thin; pieces the size of hens' eggs are proper, weighing about three ounces. If they have to be stored after cutting, keep them in a cool place with wet cloths laid over the box to keep them from wilting.

Starting before planting.—For early results, Potatoes may be artificially started. Ordinary methods allow the Potatoes to be exposed to light and air in a room of moderate warmth until the Potatoes sprout, when they are cut and planted.

A better method is to select the Potatoes of a uniform size, and to range them, seed-end up, either in

dry sand in shallow boxes or in trays with slat bottoms. To save space the trays may be set in a rack, with circulation of air between them. Expose to the light (but not the sun) in a room of fairly uniform temperature at from 60° to 75°, six to eight weeks before the time for setting out. When the Potatoes are ready to set out they may be held back, for as much as a fortnight if weather conditions are poor, by controlling the temperature; at the right time they may be set out, and will give marketable results a week to a month before the ordinary crop, while the yield is likely to be larger. An advantage of this method is that the seed Potatoes need be no larger than hen's eggs.

By still another method the Potatoes, cut in half lengthwise, or to ordinary seed-pieces, may be set closely in a coldframe and covered with four inches of light earth. Give enough air to prevent condensation of moisture on the glass, and in a late season keep the frame cool so that the Potatoes will not come on too fast. Started about two months before they are wanted, (or late in March) in an ordinary season the sprouts will just be showing above ground at the right time. They are then set carefully in the field, and will give an early yield. (See Rhode Island Bulletin No. 36.) Similar treatment in a hotbed will bring them on more quickly. For very small operations, Potatoes may be started in pots under glass.

Distances.—Rows apart, for hand culture, twenty-

four to thirty inches; for horse culture, three feet or more. Plants in the row, twelve to eighteen inches apart; the richer the soil and the better prepared the closer they may stand. The custom of planting two small seed-pieces close together is not so wise as that of planting one of large size, which will not dry out so quickly in a drought, and will better withstand wet.

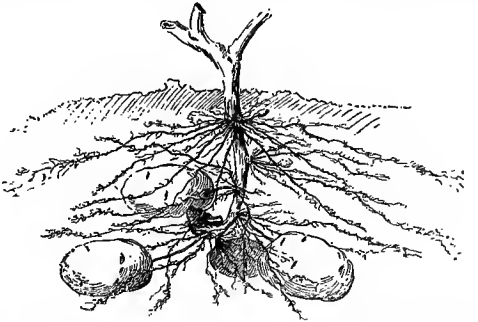

Fig. 102. Underground parts of the Potato plant, at the right depth. The withered seed-piece is between the four tubers.

Distances are also a matter of variety: plant strong-growing or large-yielding kinds farther apart.

Depth.—In heavy, clayey soils three inches may be allowed. But generally speaking, it is not wise to plant less than four inches deep; if planted shallower the tubers may be sunburnt, if deeper the cost of digging increases too much. It is well, however, to plant the late crop a little deeper than the earlier.

Sow.—For early crop, sprouted under glass, set out when frosts are past, about the last week in May. Set

seed-pieces for medium crop about May 1, or when heavy frosts are over. For late crop, set seed-pieces the first week in June.

Transplanting.—In setting out Potatoes which have already sprouted, be careful not to break the sprouts.

Culture.—Cultivate once or twice before the Potatoes break ground, to kill the weeds and preserve the mulch. After the plants are up, in case of frost cover them with straw or earth at night. Make every effort to preserve soil-moisture. Cultivate after rains, and keep the soil in good condition, until the plants cover the ground. The early cultivations may be deep, but when once the plants are growing well cultivation should be shallow, on account of the surface-feeding roots. For the same reason it is not advisable to hill up the plants, unless the loam was so thin that shallow planting was necessary, or unless the plants are of an early variety which forms its tubers near the surface. In these cases hilling may save the Potatoes from sunscald, but moisture will be wasted and the upper roots will be injured. To keep the soil in good condition from five to ten cultivations will be necessary, according to conditions.

Mulching with hay or manure is possible in garden practice, to increase the yield and save labor. Apply when the plants are growing well.

Fertilizer.—As above stated, fertilizer should be

applied to the ground before planting the crop. Some growers apply the fertilizer broadcast before sowing, and harrow it in; many cast it directly in the row and cover it with earth before dropping the seed-pieces. In any case it should not be allowed to touch the seed-pieces.

The mixture may contain nitrogen three per cent, preferably as nitrate of soda; phosphoric acid six per cent, preferably as dissolved boneblack or superphosphate; and potash ten per cent, preferably as sulphate of potash.

Or, using a different formula, an application of 1,300 pounds per acre may be given by a mixture of 100 pounds nitrate of soda, 300 pounds cotton-seed meal, 200 pounds ground bone, 400 pounds acid phosphate, 300 pounds sulphate or muriate of potash; the formula being nitrogen 3 per cent, phosphoric acid 3 per cent, potash 12 per cent. It should be remarked that the sulphate of potash gives a better-looking Potato than the muriate.

Voorhees remarks that for late Potatoes, having a longer period of growth and usually grown on heavier soils, applications of 600 to 800 pounds per acre may prove enough, the formula to be nitrogen $2\frac{1}{2}$ per cent, phosphoric acid 6 per cent, potash 8 per cent.

Harvesting.—The early crop may be dug when the Potatoes are of marketable size. Very early Potatoes may be got for the home table by carefully digging a

few from each plant, taking care not to injure it. This operation is called "grabbling," and is occasionally resorted to by market-gardeners.

For the late crop, remember that so long as any part of the plant is green the tubers continue to grow. At a Vermont Station test "more than one-third of the crop was made after September 1." (Farmers Bulletin No. 35.)

Dig carefully with an ordinary fork, which is probably better than the potato hoe; for large operations there are special machines. It is wise to keep the Potatoes from the sun.

Storage.—After the Potatoes are dug, get them away from the light as soon as possible, and store in bins or barrels in a cool, dry and dark place. Storage in the South is a troublesome matter, and the "seed" has often to be imported. Potatoes should not be frozen, as they are thereby ruined.

Fig. 103. The two potato-blights. Early blight on the right, late or true blight on the left.

Diseases and pests are chiefly, to the parts above

ground, early or leaf blight, late or true blight (sometimes called rot), brown rot, the flea-beetle, and the potato-beetle, or potato-bug. These can one and all be controlled by spraying with a mixture of Bordeaux mixture and Paris green. Convincing figures are given in Bulletin No. 221, New York Experiment Station,

Fig. 104. Adult of the Colorado beetle, or "Potato bug."

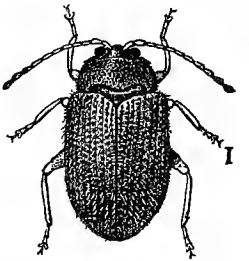

Fig. 105. Potato flea-beetle. Much enlarged.

Geneva, 1902, also Bulletins Nos. 264 and 267, 1905, to show that not only for diseases and pests but also for the plants themselves Bordeaux mixture mixed with some arsenite, usually Paris green, will give results that will more than repay the cost. "Commence spraying when the plants are six to eight inches high and repeat the treatment at intervals of about two weeks as long as the plants remain green. Usually six applications will be required. Use the one to eight formula Bordeaux mixture, adding Paris green or other arsenical poison when 'bugs' are plentiful." Apply thoroughly. It is not wise to wait for the appearance of disease, but "those who wish

to get along with three sprayings should postpone till there is danger of injury from 'bugs' or flea-beetles, and then spray thoroughly. . . . There is no excuse for using Paris green alone for 'bugs.' Whenever it is necessary to fight insects alone, use Bordeaux containing Paris green."—New York Bulletin No. 221. Use four to six ounces of Paris green to every fifty gallons.

Scab is an underground enemy of Potato, causing the familiar roughnesses of the skin. Against it: (1) Plant on scab-free land. (2) Treat the seed, either with a solution of corrosive sublimate (two and one-half ounces in two gallons hot water; dilute in ten hours to fifteen gallons) or with formalin (mix eight fluid ounces of formalin ["otherwise known as forty per cent formic aldehyde"—Farmers' Bulletin No. 91] with fifteen gallons water). Seed-potatoes should be thoroughly washed, and soaked in the solutions, corrosive sublimate for one and one-half hours, formalin for two hours. All seed soaked in corrosive sublimate should be either used or destroyed, on account of the poison. Or roll the seed-pieces in sulphur, three hundred pounds per acre, strewing the remainder of the sulphur in the open row.

Minor troubles of the Potato are: Tip-burn, leaf-burn, or scald, caused by too wet or too dry weather: spray with Bordeaux and cultivate carefully. The mole cricket, usual on wet land: plant on dry ground. The stalk-weevil: burn infested tops. For the brown rot

stalks and vines should also be burned as soon as diseased. For bacterial blight, rotation. Special treatment for the flea-beetle, besides Bordeaux and Paris green: tobacco dust or decoction, kerosene emulsion.

POTATO, CANADA. See Jerusalem Artichoke, under A.

POTATO, SPANISH. See Sweet Potato, under S.

PUMPKIN. See Squash.

Fig. 106. A spray of French Purslane. One-third natural size.

PURSLANE (*Portulaca oleracea*) is our common Pusley, which in itself is a passable pot-herb, but is best grown in its cultivated forms, of which Vilmorin-Andrieux names three; they are, however, seldom offered by American seedsmen. The common weed is a trailing plant; the developed kinds grow upright, with larger leaves and fleshy stems. The plant is tender to frost, but thrives

in heat. The young leaves are sometimes used raw, in salads.

Soil should be light, rich, and quick.

Distances.—Rows a foot apart.

Depth.—One-fourth to one-half inch.

Sow when frosts are past, about June 1.

Thin to four to six inches apart in the rows.

Pick the leaves and young stems in about sixty days; a plant will give repeated pickings if not too severely stripped. It is best not to allow the plant to go to seed, but it is not likely, in the cultivated varieties, to become a pest.

PURSLANE, WINTER (*Claytonia perfoliata*). Winter Purslane is given by Vilmorin-Andrieux as a plant of a different genus. Apparently it will stand some frost. Cultivate like common Purslane.

QUINOA is Annual Goosefoot. See under G.

RADISH (*Raphanus sativus*) is grown for its roots, which are eaten raw. It is hardy in frost and likes a cool situation; its varieties — spring, summer, and winter—can be grown the season through, although quite different in characteristics. The spring, forcing or fall Radishes are of quick development and as quick decline, soon becoming hot, stringy, pithy, or hollow. They are frequently sown with slow-developing crops,

being out of the way, if picked at their prime, before the others need the ground. The summer Radishes are larger, grow more slowly, and stay in good condition for a much longer time. The winter Radishes may be grown much as beets or turnips, and can be stored over winter. Shapes of Radishes vary from spherical through half-long to long; the color of the spring Radishes is

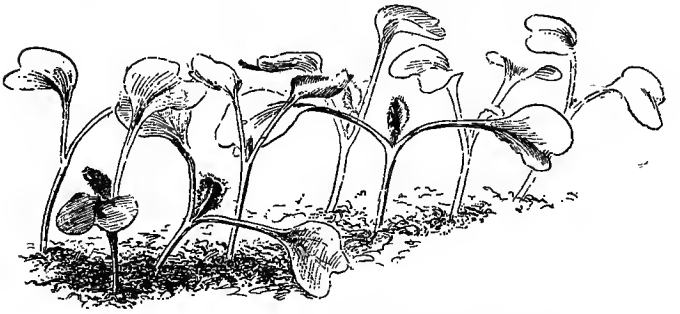

Fig. 107. Seedlings of Radish. Nearly natural size.

chiefly red and white, but the summer and fall Radishes are also yellow, gray and black. For best results the seed of Radishes should best be sifted through a mesh of two-twenty-fifths inch; smaller seeds give a variable crop. The great pest of the Radish is the root-maggot, which is so troublesome that in some soils the plant cannot be successfully grown until the pest has been starved out. Coldframe culture in such soils is possible, however, since the season is too early for the maggot.

Soil for early Radishes should be light, warm, and

quick. Later sowings, after frosts are past, should be in cooler ground. The Radish does not like, however, clayey or heavy soils. The soil should be in good physical condition, though for the round spring Radishes only about four inches of good soil is necessary.

Fig. 108. A bunch of spring Radishes. One-third natural size.

Distances.—For the spring Radishes sow in drills six inches or more apart and thin to two to three inches. Or sow broadcast in small beds. For summer and winter Radishes sow according to size of variety, generally in drills twelve to eighteen inches apart; thin to six inches.

Depth.—About one-half inch. Deeper in summer, or in dry soil.

Sow.—If sown under glass, Radish must have a cool temperature with no bottom heat, or it will run to top. Early and late coldframe culture suits them; if in the house, day temperature may be 65° to 75°, night 45° to 50°. They may be forced the winter through.

Sow spring varieties outdoors as early as the ground can be worked, and for succession every week or ten days until the middle of June. Sow again in late August for the fall crop. Summer sowings seldom do well, and should be in cool ground with partial shade or a northerly exposure.

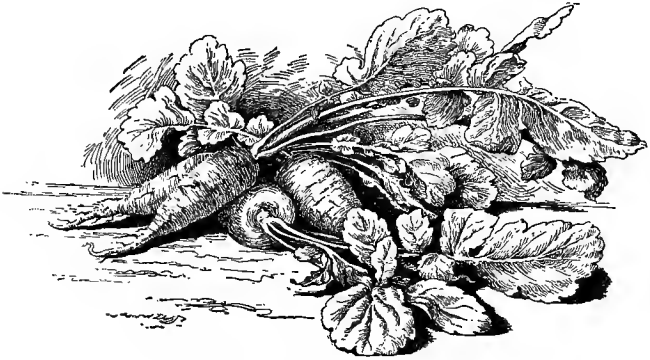

Fig. 109. Radishes, the long type.

Sow summer varieties from May through July, every two or three weeks for succession.

Sow winter radishes in May or June. Of these there is usually but a single crop.

Sow always thinly.

Thin to three to six inches, according to variety.

Transplanting.—Where the time and labor can be given, transplanting will give better results, as the weak plants are discarded and the crop will be uniform. Transplant at the fourth leaf.

Culture.—Thin early, preserve the surface mulch.

Pick the spring and summer Radishes when of the proper size, according to variety. The summer Radishes may stay in the ground after reaching the right size, a little longer than the spring Radishes.

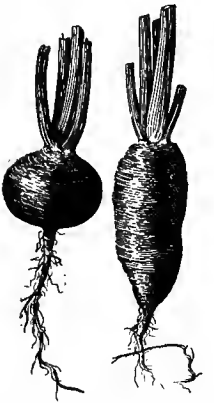

Fig. 110. Two types of early Radishes. One-half natural size.

Dig the winter radishes in the fall, and store in sand or in pits.

Use.— Before eating winter Radishes, soak an hour in cold water.

Pests.—Chiefly the root-maggot, which may be killed by injecting bisulphide of carbon into the soil near the plants—a process not worth the results. It will be better to dress heavily with unleached wood-ashes after sowing, or still more heavily with tobacco dust. Or sprinkle once a week with carbolic acid emulsion, one to thirty. Screen to keep away the flies. If these fail, try rotation. See Cabbage-maggot.

Store in sand.

RADISH, EDIBLE-PODDED. There are two edible-podded Radishes, of which the Madras will not flourish in our climate. The Rat-tailed Radish, *Raphanus caudatus* (so called for its long, slender seed-pods, for which

it is grown), may be grown in our summers, sowing in June. Treat as a summer Radish, drills twelve to eighteen inches apart, thin to nine inches. Pick the seed-pods when young, as they develop, and eat raw or else pickle.

RAMPION (*Campanula Rapunculus*) is a biennial plant grown as an annual for its leaves and roots, used as a fall and winter salad. The seed is the smallest of all vegetable seeds, and should for sowing be mixed with sand or earth, and merely pressed into the soil. Although a biennial, the plant will sometimes run to seed in a hot summer, and to prevent this it should not be sown before June. The leaves may be gathered in the fall, and the roots should be stored in sand for use as needed. The flavor, either of leaves or roots, is not agreeable to all. Scrape the roots before using.

Sow in June, to prevent running to seed.

Soil should be rich, light, and loose. Shade the seed-bed; or water at times, carefully, so as not to wash out the seed.

Distances.—Drills nine inches or more apart, or sow broadcast.

Depth.—Merely press the seed into the soil.

Thin to at least four inches each way.

Culture should be frequent.

RAPE is sometimes grown as a salad plant, like mustard or cress.

RHUBARB or Pieplant (*Rheum Rhaponticum*) is grown for its leaf-stalks, used in desserts, pies, and wine. It is a perennial plant, usually propagated by root-divisions, as the seeds seldom give good results. "Not more than fifteen per cent can be counted on to be true to the varietal type." (Cyclopedia of American Horticulture.) Rhubarb should have its place in every

Fig. 111. Rhubarb seedlings. Two-thirds natural size.

home garden; six plants are enough for the ordinary family, and if the roots are well fed and occasionally pruned or reset they will yield for twenty years or more. Rhubarb will stand considerable neglect, but for good results requires high feeding with manure as well as with fertilizers. It is usually mulched in the fall with manure, in the northern states, for an early start, since it is chiefly prized for its earliness. In the spring the fine part of the manure may be forked into

the ground, the coarser left for a summer mulch, though the leaves of the spring crop may be left on the ground for the same purpose. Rhubarb may be forced while in the ground, for an extra-early crop; or the roots may be lifted and forced in the house, after which they are of very little use and should be thrown away. Unless the seed is needed the flower-stalk should be cut off, since to develop seed weakens the roots. Varieties are very few, and good results depend upon feeding the plants rather than on variety. A winter Rhubarb has lately been advertised, of special use for forcing under glass. The plant has no troublesome enemies or diseases.

Soil should be rich and deep, and for an early start it should be warm and quick. Prepare the bed, or the hill for each plant, to a depth of two feet if possible, working in much compost or well-rotted manure. If the plants are to be raised from seed no such preparation is necessary. See under Rhubarb from seed, below.

Distances.—Set roots four to five by three to four feet. Four by four feet is the usual garden distance.

Roots should have one to three good eyes.

Depth.—Set roots with the eyes one to three inches under ground.

Plant roots in fall or spring. In colder places spring planting is usual.

Culture consists merely in keeping down weeds and preserving the mulch until the leaves cover the ground.

Fertilizer.—Dig manure around the plants in spring, and dress with a good general fertilizer in midsummer. Besides this, dress monthly with nitrate of soda or liquid manure.

Pick lightly from roots in the second year. "Pulling" the stalks is a special knack, and care should be taken not to tear the crown. Pull downward and outward with a quick pull or jerk. After the second year the stalks may be pulled, moderately, all through the summer, or cropped more heavily until about the middle of June. Do not exhaust the plants. For summer use choose the smaller stalks.

Cut off all seed-stalks.

Protect in fall by a mulch, three to four inches thick, of coarse or fine manure, compost, or earth. Level this in spring and work the fine manure into the ground. The plant will live through the winter without the mulch, or with only the protection of its own leaves, but the mulch prevents deep freezing and so allows an earlier start.

Rhubarb from seed is scarcely profitable. Plant the seed in drills twelve to eighteen inches apart, at a depth of about one inch. Thin to six inches or more and give good culture. In the fall or spring take up the promising plants and set in their permanent positions.

Forcing.—Rhubarb may be forced in the field by placing over each plant a barrel, half-barrel, tub, or box, having no top or bottom, and piling around it

heating manure; the plants may be picked until the unforced plants begin to yield, and no ill results will follow.

Or Rhubarb may be forced by taking up the roots and allowing them to freeze thoroughly. Preferably, keep frozen for a month or more, though with thawing and freezing good results have been obtained. They should then be placed in a dark and cool cellar (temperature at 55° to 60°), and packed closely in good rich earth. Cover three to four inches, keep moist; water but slightly until the shoots appear, when give more water. Forced in the dark and in not too hot a place, the best results are gained.

Fig. 112. Stalks of forced Rhubarb. (The leaves do not develop.)

Ether forcing is the same as the above, but the plants are first treated with the fumes of ether in a close box, ten cubic centimeters of liquid ether being used to a cubic foot of space. Expose forty-eight hours, and then pack in earth. Much greater results are thus obtained.

Plants not too much forced by the ordinary method may be put back in the field and used again after two or more years. Ether forcing exhausts them entirely. Three or four pickings are usual from forced roots.

Renewing.—Plants in the field should be taken up every three or four years, separated, and parts reset in the same ground. Or with less trouble the outer parts of the roots may be cut off with a spade, without disturbing the part to be left in the ground. If this is done in the fall the parts taken away may be forced; or in either fall or spring they may be reset.

Pests.—Against the Rhubarb-beetle cut the leaves regularly, making sure that all the early leaves are removed by midsummer, thus destroying eggs and larvæ. Burn the leaves. Destroy all neighboring dock plants.

ROCAMBOLE (*Allium Scorodoprasum*) is a hardy perennial plant of the Onion family, grown as an annual for its compound bulbs, which are used as garlic. The plant seldom produces seed, and may be propagated by its "tops" or bulblets, produced at the end of the twisted stem, but it is grown more usually and profitably by planting the cloves or parts of the bulbs. The flavor is milder than garlic.

Soil.—Light, rich, quick.

Distances.—Rows a foot or more apart, bulblets or cloves three inches or more in the row.

Depth.—Barely cover.

Sow in early spring, or in mild climates set the bulbs in the fall.

Lift the bulbs when the tops die, and store like onions or garlic.

ROCKET, ROCKET-SALAD, or

ROQUETTE (*Eruca sativa*) is a salad-plant, well known in France and England, but little cultivated here. It is occasionally used as a pot-herb, but in any case only the young leaves should be used; they have a flavor of horse-radish. For best results they should have plenty of water. The plant bolts in heat and is best grown only in spring and fall.

Soil.—Rich and moist.

Distances.—Rows a foot apart. Thin to three to four inches in the row.

Depth.—One-half inch.

Sow thinly in May, and every two or three weeks until June. Sow again in August for a fall crop.

Culture.—Water if necessary; preserve the surface mulch. The plants should be kept growing.

Fertilizer.—Nitrate of soda or liquid manure, weekly.

Pick only the young leaves.

ROCKET, TURKISH (*Bunias orientalis*) is a hardy perennial plant grown for its young leaves and tips, used as salad or as a pot-herb.

Soil.—Light and quick.

Distances.—Rows two feet apart.

Depth.—About one inch.

Sow in fall in mild climates, thickly; otherwise in spring, thinly in the rows.

Thin to one foot in the rows.

Pick the leaves as wanted when once the plant is established.

Mulch over winter north of New York city.

ROSEMARY, or Old Man (*Rosmarinus officinalis*), is a half-hardy evergreen under-shrub, grown for its leaves, used in seasoning and in household medicine. It is propagated by seed, by cuttings, by root-divisions, and by layering its branches. The plant requires a light protection in cold places, and should besides have a sheltered position. Varieties are: Common or Green-Leaved, the hardiest; Silver-Striped; Gold-Striped.

Soil should be light and warm.

Distances.—Two feet apart each way.

Depth of seed, about one inch; of root-divisions and rooted cuttings or layers, as before.

Sow seed in spring, in seed-bed, in drills twelve inches apart, and thin to six inches apart in the drills. Set the plants in their permanent positions in fall, or in cold climates best in spring.

Take cuttings in spring or summer, and water till established.

Layer the ends of the lower branches until rooted, when cut off, take up, and reset, preferably in spring.

Pick the leaves as wanted for use, or dry and store.

Protect in winter with a light mulch, or tie in straw if possible.

Prune moderately in winter or early spring.

RUE, or Herb-of-Grace (*Ruta graveolens*), is a small hardy perennial evergreen shrub, grown for its leaves, which are used in seasoning, though their taste is to some even offensive, besides being bitter. They are raised from seed, root-divisions, or cuttings. The plant requires little protection beyond a sheltered position, except in the colder parts of the country, where it should be mulched with leaves or litter.

Soil preferably light, well drained and limed.

Distances.—Nine by eighteen inches.

Depth.—About one inch.

Sow in spring when heavy frosts are past, in seed-bed, rows apart as convenient.

Thin when well up to three inches.

Transplant to permanent positions at about six inches.

Take cuttings in early summer, and set in seed-bed, six inches or more each way, watering till established. Transplant the following spring, or in mild climates in the fall.

Set root-divisions in spring. Depth as before.

Pick the leaves as wanted. Or dry and store.

RUSH-NUT. See Chufa.

RUTABAGA, or Swedish Turnip (*Brassica campestris*), is a plant grown for its roots, used chiefly for stock-feeding, but also for table use. It has a richer flesh than the Turnip, and requires a longer season. Being hardy to frost, it may be left in the ground late before digging; it will live over winter, but should not be left unless wanted for seed. Rutabaga is usually sown in June for a fall crop. There are several varieties, and for table use the finest-fleshed should be chosen.

Fig. 113. Rutabaga.

(Rutabaga is called by the English Turnip-rooted Cabbage, a name which we reserve for Kohlrabi.)

Soil.—A rich medium loam in good tilth, not recently manured.

Distances.—Drills twelve to eighteen inches apart.

Depth.—One inch or more.

Sow when the ground is fit, and monthly until June or early July.

Thin to six to nine inches in the rows.

Culture.—Maintain the surface mulch.

Fertilizer is not necessary if the ground is previously well enriched, unless nitrate of soda is used. See under Turnip.

Dig after frosts have come.

Store in a cellar, in sand, or in a barrel.
Diseases and *pests.* See Turnip.

SAFFRON (*Crocus sativus*) is a bulbous plant grown for the pistils of its flowers, which are used in flavoring, and for coloring cookery. As the work of gathering the pistils is minute and laborious, the plant is seldom grown in gardens.

Set out bulbs or corms in early June, and cultivate the ground until the flowers have been picked and the foliage has died. Take up the bulbs, separate them from their small offsets, and reset in about a month, for them to root for the winter. Soil should be light and loose, well limed, and sunny. Mulch lightly over winter.

SAGE (*Salvia officinalis*) is a half-hardy perennial, shrubby plant grown for its leaves, used chiefly in seasoning, but still to some extent also used in domestic medicine. They are best when fresh. The plant is propagated by cuttings, root-divisions, from seed, and by layering. Sage is extensively grown commercially, either in permanent plantations or in rotation with other crops. In ordinary garden practice it is kept in clumps, which should be divided and reset, or at least root-pruned, every year or two. There are several varieties, but the broad-leaved green kinds are the best for general culture, although some of them produce no

seed. The narrow-leaved and red varieties do not always come true from seed and are more delicate.

Soil a medium loam, well drained, and with manure worked in.

Distances.—In seed-bed, for seeds and cuttings, rows apart as convenient. Thin seedlings to three to six inches. In permanent positions, twelve by twelve inches or twelve by eighteen inches.

Depth for seed, one inch. For root-divisions, rooted cuttings, and layers, as they stood before.

Take cuttings in spring, and set in moist, shady seed-bed. From mature wood the cuttings will be ready to transplant in six weeks. From immature, the cuttings should remain till next spring, but will give best results.

Take layers in spring, having rooted them the previous summer.

Take up roots in spring.

Sow in protected seed-bed in early spring, or under glass in March; thin to six by six inches as the plants grow, and set out when frosts are past. Sow in open ground in May.

Cut when the plants are well established, but do not cut too heavily the first year; once is enough. With old plants three cuttings are possible in a year, taking the first and best before the flower-stems appear; cut off the whole top. With plants grown as annuals only one cutting is usual.

Protect in winter with a mulch.

Reset permanent beds every year or two years, by taking up and dividing. Or prune the roots every year, by cutting off the outer clumps, which may be reset.

As an annual, Sage may be sown in spring (under glass, in seed-bed, or in the open ground, as above) and picked in the fall.

Dry the leaves, and rub to powder. Store for use.

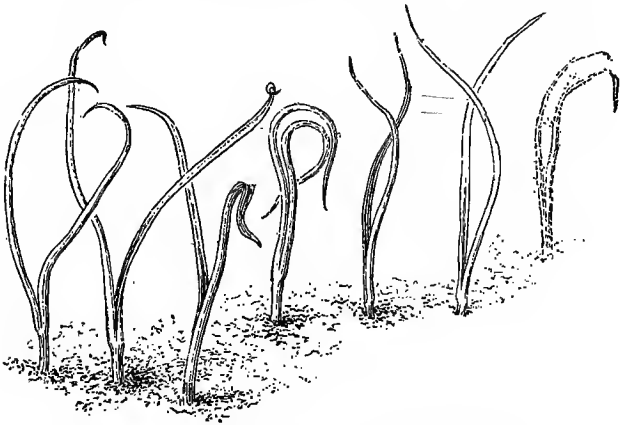

Fig. 114. Salsify seedlings. Two-thirds natural size

SALSIFY, Salsafy, Oyster Plant, or Vegetable Oyster (so called for its taste of oysters) is *Tragopogon porrifolius*, a biennial plant grown as an annual for its roots. The young leaves are sometimes used as salad. It is hardy to frost, and may be sown early; a long-season plant, it requires the ground for the whole

season. Its seeds, which are really fruits, are long and thin, difficult to sow in the seed-drill. The roots, like those of parsnip, can be left in the ground all winter without detriment. Varieties are few, and are distinguished chiefly by size, the largest of them being small compared with other root-crops. See also Scolymus and Scorzonera, which may be used as substitutes.

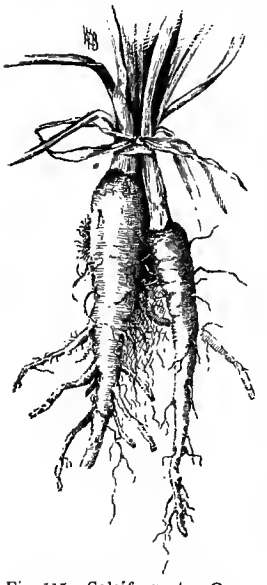

Fig. 115. Salsify roots. One-sixth natural size.

Soil.—Should be deep, cool, rich, and not recently manured. It should be freshly and deeply dug.

Distances. — Rows twelve inches or more apart, preferably eighteen inches.

Depth.—About one inch.

Sow in early spring, or in May at the latest.

Thin to five or six inches. Thinnings may be transplanted, but the tap-root should not be injured.

Culture.—Preserve the surface mulch, until the tops cover the ground.

Fertilizer.—Dig in, before sowing, a good general fertilizer, rich in potash.

Dig when of large enough size, as wanted. Or leave over winter and dig in spring.

Store roots taken for winter use, in sand or away from air.

Diseases and pests are few and not troublesome.

SALSIFY, BLACK. See Scorzonera.

SALSIFY, SPANISH. See Scolymus.

SAMPHIRE (*Crithmum maritimum*) sometimes called Sea-fennel, St. Peter's herb, and Parsley Pert, is a hardy perennial, grown (with some difficulty except at the seashore) for its leaves and young shoots, used in seasoning, salads, and pickles. It is propagated by root-division, or by seeds sown as soon as ripe. Golden Samphire (*Inula crithmifolia*) is not so pleasant to the taste as true Samphire, but is cultivated in the same way.

Soil should be light and sandy, with a warm aspect. In France and England the plant is if possible grown at the foot of a sheltering wall.

Distances.—One by two feet to eighteen by thirty inches.

Depth.—Cover seed lightly. Roots the same as before.

Sow seed as soon as ripe (in August and September), as it rapidly loses the power to germinate. Sow

in seed-bed, rows one foot apart, thin the seedlings to six inches apart, and mulch over winter.

Set out young plants, or root divisions, in spring, after frosts are past.

Culture.—Keep free of weeds till the plant covers the ground.

Fertilizer.—Except at the seashore, where the plant will usually thrive, water occasionally with sea-water or a solution of sea-salts; or with weak solutions of salt and soda; or sprinkle the ground in spring with powdered barilla.

Pick the young leaves and tips as wanted, in August and September. They may be pickled.

Protect over winter with a mulch.

SAVORY, SUMMER. Summer Savory (*Satureia hortensis*) is an annual plant grown for its leaves and tender shoots, used in seasoning.

Soil light, warm, and fairly rich.

Distances.—Rows twelve to eighteen inches apart.

Depth.—One inch.

Sow under glass in March or April, or outdoors when frosts are past.

Thin or set out to six inches apart in the rows. Thinnings may be transplanted.

Pick as wanted, or

Pull the whole plant when in early flower, dry, and store.

SAVORY, WINTER. Winter Savory (*Satureia montana*) is a hardy perennial, whose leaves and tips are used as above, for seasoning. It is propagated by root-divisions and by cuttings as well as by seed.

Soil should be well drained and warm.

Rows one foot apart.

Depth.—About one inch for seed. Roots as before.

Sow under glass in March or April, or in the open when the ground is fit.

Thin or set out to one foot apart in the rows.

Take root-divisions in spring. Depth as before.

Take cuttings in spring, and water till established, in a shady seed-bed. Set out in summer or in the next spring.

Culture.—Give ordinary care.

Pick the leaves and tips as wanted. Cut to the ground in fall.

Protection.—Mulch lightly, north of New York city.

Reset or renew every three years.

SCALLION (often Scullion, but improperly) is an onion when pulled young, before the bulb has formed. Its white part may be eaten raw or chopped in salads, and is popular abroad. Or the term is applied to onions which do not "bottom" or bulb well, so that the neck remains thick. Leeks are sometimes called Scallions, as are Shallots, especially a variety *majus*.

SCOLYMUS (*Scolymus Hispanicus*), called Golden Thistle or Spanish Oyster Plant, is grown and used like Salsify, though of milder flavor. Its disadvantage is that the leaves are prickly; as an offset the roots are much larger, the seeds easier to sow, and from the same space a much larger crop can be raised than of Salsify. Its roots may be left in the ground over winter. The leaves of the plants are sometimes blanched and eaten.

Fig. 116. Root of Scolymus.

Soil should be cool, rich, deep, in fine tilth, and not recently manured.

Distances. — Rows eighteen inches apart or more.

Depth.—One-half to one inch.

Sow when the ground is fit. Only one crop is usual, as the plant requires the full season.

Thin to six inches apart in the rows.

Culture.—Preserve the surface mulch, and weed.

Dig in fall or spring.

Blanch the tops like Cardoon, which see.

SCORZONERA, Black Salsify, or Viper's Grass (*Scorzonera Hispanica*), is a perennial plant usually grown as an annual or biennial, though the roots continue to enlarge if left still longer in the ground. It is much like salsify, but with roots black on the outside, while white inside. It is more difficult to raise than salsify, but some prefer its flavor. The leaves are sometimes used as salads.

Soil cool, rich, deep, not recently manured, and in good tilth.

Distances.—Rows twelve to eighteen inches apart.

Depth.—One-half to one inch.

Sow when the ground is fit.

Thin to six inches in the rows.

Dig in fall or spring, or leave still longer, as the roots continue to grow.

Store for winter use in sand away from frost.

SCORZONERA, FRENCH (*S. picroides*, otherwise classified as *Picridium vulgare*), is an annual salad plant, grown for its leaves, of which several cuttings may be had in the course of the season. The leaves have a muttony flavor.

Soil moist and shady.

Distances.—Rows twelve to eighteen inches apart.

Depth.—One-half to one inch.

Sow when frosts are past.

Thin to six inches.

Culture.—Preserve the mulch and keep down weeds.

Pick the leaves as wanted, when the plant is growing well; or pull whole plant.

SCURVY GRASS (*Cochlearia officinalis*) is a perennial plant grown as an annual, for its leaves, which are used like those of water-cress, which the plant resembles, though the taste is bitter and tarry. It is anti-scorbutic.

Soil cool and moist, if possible with partial shade.

Rows one foot apart or more.

Depth.—About one inch.

Sow when heavy frosts are past.

Thin to four to six inches in the rows.

Pick the leaves as wanted when once the plant is growing well.

SEA-KALE (*Crambe maritima*) is a perennial plant, which, like asparagus, thrives naturally near the seashore, but which (also like asparagus), can be successfully grown inland under widely varying conditions. It is chiefly an English delicacy, grown for its first shoots in spring, which are blanched, and are served like asparagus. The English prize it highly, as it comes into use in the spring when green vegetables are scarce. Besides this, however, it may be forced, the roots being taken into the house and easily brought into bearing, much as rhubarb is. Roots thus used

have lost most of their vitality, and are scarcely worth nursing back to vigor. Sea-kale is such a strong grower that it seems to pay cultivation for forcing better than other vegetables, and most English private gardens have their plantations of it. American and even French use of it is very limited, but the plant is perfectly hardy in New England, and could be used in spring as a supplement to asparagus.

Sea-kale is propagated from seed and from root cuttings; rarely from root-divisions. The root grows much like a branched parsnip, say, with several buds at the crown and with a short thick root which divides at a depth of about six inches into many side roots, often called thongs. When the main root is taken up for forcing, these thongs are also carefully taken up, lest by remaining in the ground they sprout and become troublesome. When taken they are cut into lengths for future planting. These thongs or sets should be stored over the winter in earth or sand, or may be left in a trench out-of-doors; in the spring if they have formed buds these should all be rubbed off but one, and then set out; they will make good plants for forcing or field-cutting in two years. From seed it is also possible to get a good bearing crop at the beginning of the third year, although some gardeners prefer thongs for raising permanent plants, even though the thongs be cut from seedlings.

Sea-kale, like asparagus and rhubarb, is grown in a

permanent plantation, the plants often living to ten or twelve years with good management, although if heavily cropped they should be replaced at the end of seven or eight years. Replacing a plantation from cuttings is an easy matter, however, and when properly managed a garden can always have strong plants. Sea-kale likes good cultivation, and requires some care in cutting out weak or superfluous leaf-buds, while unless seed is wanted all flower-stalks should be cut off. In cutting the blanched stalks an inch or so of the root should also be taken, or the plants will stand up out of the ground more and more each year. It is quite safe to cut at the surface of the ground.

Sea-kale is always blanched for the table, either under glass by artificial methods as described below, or by earthing-up or covering over in the open field before the plants start in spring. If blanched under glass, heat is generally used; in the field heat may be used for an early supply, and other plants may be left to come on naturally later. By one method and another the English manage to stretch their Sea-kale season from about Christmas until late in spring.

Varieties are few, Vilmorin-Andrieux naming but four. American seedsmen seldom offer more than one, which may be supposed to be the Common Sea-kale. Of this the leaves tinge purple when exposed to light after blanching and before cutting. The Lily-white has not that habit.

Soil.—Sea-kale will grow in many soils, but the best is rich, cool, moist, deep, and in good tilth. If heavily manured, so much the better. Fertilizers with a good proportion of nitrogen may be worked in.

Distances are according to the purpose. A good scheme is: set the seedlings or sets twelve by eighteen inches. At the end of the second year every other plant and the alternate rows may be taken up for forcing, leaving the rest as a permanent plantation at three by two feet. In very good ground this distance may be increased to four feet apart each way. In the seed-bed sow in rows a foot apart and thin to six inches in the rows; or sow in rows closer together and when the plants are two to three inches high, transplant to twelve by six inches, to grow for the first year. Twelve by twelve is better, if the space can be spared.

Depth.—Of seed, one and one-half to two inches. Of seedlings, as they were before. Of thongs, cover about an inch, setting them upright.

Sow.—The seed as bought is in a pod or capsule, which it is the practice to sow without shelling, but if shelled they sprout more quickly. Although Vilmorin-Andrieux says that but one plant will come to each pod, frequently two or three will be produced. Sow seed under glass in March, in the coldframe as early as possible, in the open when the ground is fit. Seed may be sown in the hills, four to five to a hill, at the permanent distances.

Thongs may be started under glass in March or April, and set out when well hardened, about May 1, or when heavy frosts are past. Set thongs ordinarily (not started), when the ground is fit.

Thin seedlings as under Distances. Thin hills to one plant.

Set out seedlings or thongs as above, either at half distances, the intermediate plants to be taken up for forcing, or at the full spaces.

Culture for the first year should be clean, no especial care being needed. Mulch over winter, and in the second spring transplant.

Culture for the permanent plantation consists chiefly in cutting out all superfluous leaf-buds and all flower-stalks. Cut in the early spring to three or four strong buds, and occasionally during the year make sure that no more have formed. A cluster of leaves comes from each bud. Keep the surface of the soil in good condition, or mulch with manure, until the leaves cover the ground.

Fertilize.—In the spring work into the ground well-rotted manure. Occasionally during the year dress lightly with nitrate of soda or liquid manure, though in case of a manure mulch these will not be so necessary. In August dress with a good general fertilizer. It is an old habit to sow salt on the soil once a year, but as in the case of asparagus the advantage is doubtful. Kainit is preferable.

Blanching is necessary to make the young shoots tender and to remove the natural bitterness of the plant. It should not be attempted until the plant, from transplanted seedling or from thong, has been growing undisturbed for two years. The shoots have thick meaty midribs with the slightest amount of leaf, and are best at from six to ten inches, the shorter being the better and more tender.

The shoots are blanched by keeping them from the light. For outdoor blanching, cover the plants in the fall, or in the spring before they start, with light earth, sand, or litter, to the depth of six to ten inches. Or inverted pots may be used, the bottoms stopped; or boxes may be placed over the plants. As the shoots come to the proper length, they may be cut. If earthed, cut as soon as the tips show.

Forcing in the field is done by heaping heating manure around the plants, but not so as to be in contact with the shoots. Pots or boxes are best used to cover the plants. By forcing a few plants in this way, several pickings may be had before the field-plants come naturally into bearing.

Forcing the roots after lifting is a common practice, and is resorted to both for the blanched tips and for the thongs to make new plants. Take up the plants in the fall, when the foliage is dead, and after breaking off all side-roots trim the main ones to six to nine inches in length, and take out all but one dormant bud,

Uniform lengths are best for convenience in forcing. Store the roots in sand or earth where they will not be frozen in, or in sand in a cold cellar, until wanted. (As for other plants, a period of rest before forcing is advisable.) The side shoots are used for sets, as below.

Methods of forcing are innumerable; it is done either outdoors in trenches or in frames, in the ordinary house-cellar or in the greenhouse. In any case the roots are packed closely together in earth, the crowns just showing, and are then covered six to nine inches with any loose material; or are covered with pots or boxes of sufficient depth. If the roots stand over manure, a few inches of earth should be between. Heat should be applied gently and slowly, and should seldom be above 65 degrees; 55 to 60 degrees is generally considered enough. When the shoots push through their covering, they may be cut, taking part of the crown with them, for convenience in handling. The roots, once forced, are best thrown away. Forced shoots seldom come to the same length at the same time, and the bed must be repeatedly gone over until all are cut. Ether forcing might be as successful as with rhubarb, which see.

Cut all shoots with a part of the crown. As said above, in the plantation it is safe to cut to the ground.

Mulch in the fall with several inches of rough manure. In the spring rake off the straw and work the rest into the ground. Sea-kale being hardy, the mulch

is not needed so much for protection as to prevent deep freezing and aid an early start in spring.

Renew the plantation when the plants grow less vigorous. The new plants, from seedlings or sets, may be set between the old ones for two years, and then the old ones taken out; this is only possible if the plants have been set at generous distances, four feet or more each way.

Sets or thongs when taken should be trimmed to about nine inches, though less will do. Trim the top square, the bottom slanting; tie in bundles, and store in sand in the cellar, or out-of-doors in a trench. In the spring take up and set; if they have formed crown buds, rub off all but the strongest from each set. Plant with a dibber, covering one inch deep. Sets are occasionally lifted in the spring. They will vary in size from that of a quill to that of the little finger, and may be cut as short as four inches if the roots are few.

SEA-PURSLANE. See Orach.

SHALLOT (*Allium Ascalonicum*) is a plant of the onion family producing a small gray or russet bulb, compound, its parts pointed. It is grown for these bulbs, used in seasoning, the flavor being milder than that of onion; the green leaves are sometimes eaten. Shallots are not raised from seed, but from their cloves,

or parts of the compound bulb. Varieties are the true Shallot (of which Vilmorin-Andrieux gives three sub-varieties) and the Jersey, Ghent, Russian, and Alençon Shallots, all larger and of differing botanical characteristics. Cibol is another name for the plant. Small brownish onions are often sold as Shallots.

Soil.—As for onion. Most good garden soil will do if not too dry.

Distances.—Rows one foot apart, cloves three to five inches in the row.

Plant in spring, setting the point of the clove just below or at the surface.

Culture should be clean, but not deep.

Pull when the tops die down; dry and store like onions.

SKIRRET, formerly also called Skirwort, is *Sium Sisarum*, a plant once grown much more than today, for its roots, which are clustered like a dahlia's, though thinner and longer. They are served like parsnip or salsify, and are palatable and pleasant; their disadvantage is in their fibrous core, which must be removed before cooking. Vilmorin-Andrieux, remarking that seedlings differ in their amounts of core, suggests that a coreless strain might be bred. Skirret is grown from seed or from root-divisions. No varieties are offered.

Soil deep, rich, cool, not recently manured.

Distances.—Rows twelve to eighteen inches apart.

Depth.—One-half inch for seed. Set roots two inches deep.

Sow in autumn in mild climates; ordinarily in spring when the ground can be worked.

Thin or *transplant* to six to nine inches in the rows.

Take offsets or *root-divisions* in spring, and set out to the same distances.

Dig in the fall, or

Leave roots in the ground until spring.

Store in sand in the cellar.

SOLANUM COMMERSONI is a plant allied to the potato and a possible future rival of it, long ago recommended for its use in certain conditions, but still very little known. It is grown like potato in all particulars except depth of planting, which should be four inches or more in dry soil, barely covering in wet. It thrives in heavy, wet, or chalky land, yields well under the peculiar conditions which suit it best, is very little troubled by disease, and will stand a little frost, even the tubers sharing in this quality.

SORRELS and **DOCKS** are various perennial plants of the genus *Rumex*, not very far advanced from the wild state, but grown in gardens, especially in Europe, for the sake of their very early yield in spring, when green vegetables are scarce. The earliest is probably the Spinach Dock, which is Patience Dock, or the Herb

Patience of the old herbals; other Sorrels follow it in succession: Bailey names the Belleville, or Broad-leaved French, and Vilmorin-Andrieux gives this and still others. All the Sorrels and Docks are acid (the Patience Dock perhaps least so), and especially in spring, when this is prized. Round-leaved Sorrel (*R. scutatus*) is the latest in succession, being grown in summer. Sorrels are usually given an out-of-the-way place in the garden, and allowed to spread; but they are best when grown in rows. The flower-stalks should always be cut off, so as not to weaken the plants.

Soil rich and somewhat moist. Acid soil is good for Sorrel.

Distances.—Rows eighteen inches apart, plants six inches in the rows.

Depth.—One-half to one inch.

Sow seed in the drills, or

Set root-divisions in spring.

Culture.—Grub out all suckers, in row culture. Cut off all flower-stalks.

Pick the large leaves (rather than take the whole top at one time) so as not to exhaust the plant.

Renew the plantation after a few years, when the plants seem weaker.

SORREL, WOOD. Wood Sorrel is *Oxalis acetosella*, a perennial plant seldom cultivated, and not offered by seedsmen. Roots may be dug from wild plants and set

in the garden. Once there, they must be carefully restrained, or they will multiply rapidly. Cut off all flower-stalks, and when once the plants are established pick the leaves as wanted. Set in cool soil, the plants in a bed, or individually at about one foot each way.

SORREL, DEPPE'S, WOOD. Deppe's Wood Sorrel is *Oxalis Deppei*, a Mexican plant grown for both roots and leaves. Serve the leaves as salad; the roots, peeled, salted, and cooked like asparagus, are sometimes used, but are rather insipid. The plant is multiplied from bulbels which grow on the root, or by root-divisions.

Soil rich, moist, and if possible partially shaded.

Rows one foot apart; bulbels in the row six inches.

Cover about one inch.

Set root-divisions twelve by six inches.

Cultivate frequently. Cut off all flower-stalks.

Cut the leaves as wanted.

Mulch lightly in winter. Except in very cold positions the plant is hardy.

SOJA BEAN or

SOY BEAN. See Bean, Soy.

SPEARMINT. See Mint.

SPINACH or **SPINAGE** (*Spinacia oleracea*) is a short-seasoned plant which bolts in heat, and therefore grown chiefly as a fall or spring crop, for its leaves, served boiled. Spinach comes to maturity in from six to eight weeks, is very hardy to frost, and may be kept over the winter in the North, under a mulch, though in New England not all of the plants will live. It may also be wintered in frames, and brought into growth

Fig. 117. Spinach seedlings. Two-thirds natural size.

very early, or even made to give a winter yield under favorable conditions. Spinach was formerly forced, in great quantities, but the southern crop has now almost crowded forced Spinach from the northern markets. Varieties are under two heads, the prickly-seeded and the round-seeded, the former the hardier, the latter the more heat-resistant. Diseases and pests are sometimes troublesome.

Soil.—For early crop, rich, light and quick. For a later, cool and moist. Manure may be dug in, and the commercial fertilizer should be rich in nitrogen. At

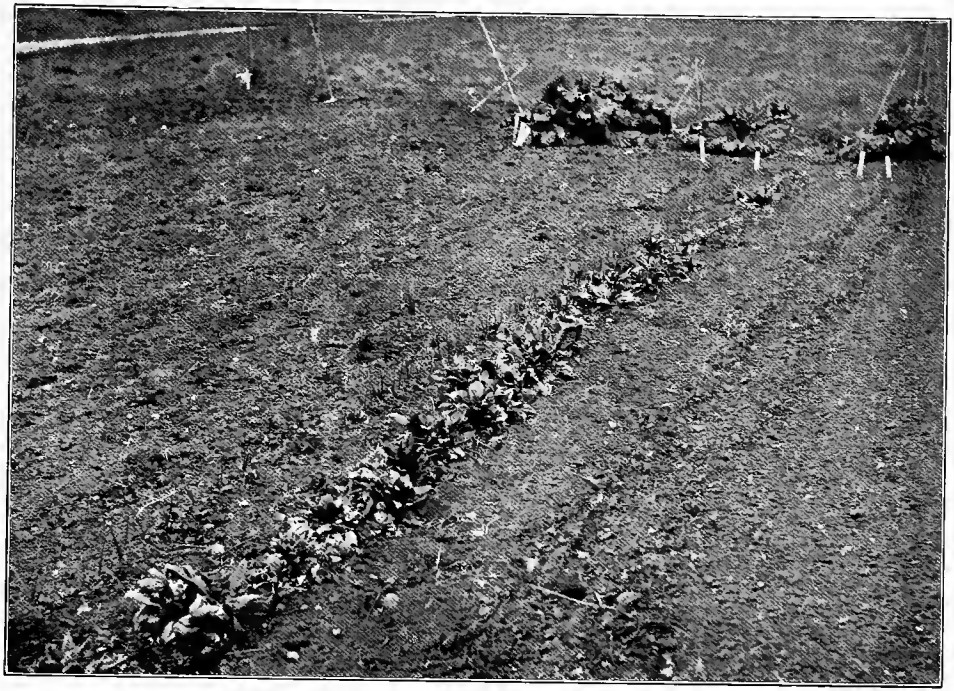

PLATE VII. Fall-sown Spinach after Wintering

In the latitude of Boston. The season is shown by the height of the Rhubarb and of the Onion Sets. Note the gaps in the Spinach: Some plants will winter-kill

planting the soil should be in good tilth. For fall sowing the land should have plenty of humus and be of good texture, so as not to wash or heave.

Distances.—Rows a foot or more apart, plants four to six inches in the rows.

Depth.—One inch.

Sow about September 1 for an early crop, or in spring as soon as the ground can be worked. For later sow-

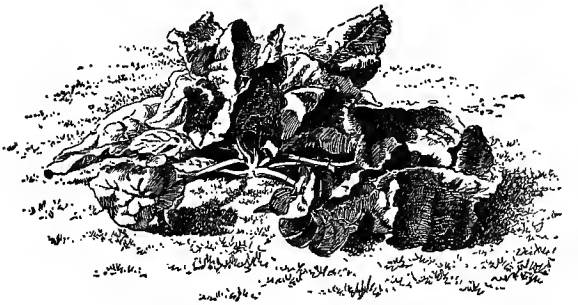

Fig. 118. Spinach plant. One-third natural size.

ings the seed should be soaked. Sow for succession every fortnight until June, and again in August for the fall crop.

Thin to four to six inches in the rows, or to nine inches for large varieties.

Culture.—Preserve the surface mulch.

Fertilizer.—The plant will be much improved by light applications of nitrate of soda or liquid manure, every ten days or two weeks.

Pick the leaves as needed, but if the plants threaten to bolt, cut the whole plant. Two or three pickings may be had for the home table from the early and late crops.

Under glass.—Very early sowings of Spinach may be made under glass in March, the plants to be set out when the ground is warm and the plants well hardened off. In the fall plants may be taken to frames, or sown in them, and can be kept growing well into the winter, or else can be left dormant, to be forced into growth by the use of glass as needed.

Protection.—Mulch the fall-sown crop with straw or hay.

Diseases.—Anthracnose, leaf-blight, mildew, and white smut may be checked by copper fungicides, which are, however, too poisonous to be safe with a pot-herb plant. Rotation, and burning all affected plants, are advised, and the soil may be treated with flowers of sulphur mixed with air-slaked lime. Try spraying with "dilute solutions of clear fungicides." (Lodeman.)

Pests are chiefly the leaf-miner, which in places makes much trouble. No remedy is as yet known; deep plowing in fall or early spring, to bury the pupæ, and clean cultivation of the field, and of all neighboring spots to destroy pigweed, will be of use.

SPINACH, FRENCH, or

SPINACH, MOUNTAIN. See Orach.

SPINACH, NEW ZEALAND, sometimes called New Zealand Ice-plant, is *Tetragonia expansa*, a hardy annual plant which is vigorous in heat and is used as a summer substitute for Spinach. It may be started early under glass, or planted in the open when the ground is fit, and when the plants are well established they will continue to yield throughout the season, until heavy frosts. Plants are often started in the open about September 1, and taken under glass to force. The parts used are the leaves and young tips, used as greens. Given plenty of room, the plant is very productive. There appears to be but one variety, and insects and diseases are not troublesome. New Zealand Spinach is one of our best summer pot-herbs, and should be better known.

Soil.—Any good garden soil, preferably a medium loam. It should have been previously heavily manured, or dressed with a fertilizer rich in nitrogen.

Distances.—Two to four feet each way according to the richness of the ground. Or sow in drills three feet apart, and

Thin to eighteen inches to two feet in the row.

Depth of seed, one inch.

Sow under glass in February or March, having soaked the seed, as germination is slow. Transplant into pots, do not allow to become pot-bound, harden

off, and set out about May 1. Or sow in the open, when the ground is fit, in hills or drills as above. If in hills; sow three to four seeds to a hill, and thin to one plant. Successional sowings are scarcely needed, as the plants will live until winter, if not too heavily cropped. An early spring crop will sometimes come from self-seeding.

Transplant thinnings if needed, but with care to save as much of the roots as possible.

Thinning in the drills may be gradual, the young plants eaten.

Culture.—Keep the surface in good condition until the plants cover the ground.

Fertilize about once in two weeks with nitrate of soda or liquid manure.

Pick the leaves and shoots as wanted.

Under glass in the fall.—The plants will continue to yield until December if covered with frames where they stand. Or

Lift and take into the house, where if not too old or exhausted by bearing they will yield throughout the winter. Or

Mulch young plants in the fall, and they will live through an ordinary winter, although like Spinach they will not always grow vigorously in spring. For this purpose sow the last week in August.

SPROUTS, BRUSSELS. See Brussels Sprouts.

SQUASHES are various forms of the *Cucurbitæ*, including the Pumpkins and Vegetable Marrows, which are cultivated in the same way, for their large fruits.

Fig. 119. Squash seedlings. Two-thirds natural size.

Varieties are very numerous, coming botanically under the names of *Cucurbita maxima*, *C. pepo*, and *C. moschata*; culturally they divide into bush and running Squashes, the Pumpkins and Marrows being of the second type. Bush Squashes are chiefly summer varieties, while running kinds are chiefly late and long-keeping. The popular idea is that the varieties hybridize when in flower, and this is true to a limited extent of some of them, but pumpkins will not cross with Squashes. They are all tender annual plants, and must, generally speaking, complete their de-

Fig. 120. Plant of summer Squash, scallop or pattypan type.

velopment between June and September, but their maturity may be hastened by starting under glass, or under protection in the field. The soil should have plenty of available plant-food, and every effort should be made to advance the growth of the vines, so that they blossom before midsummer. Culture is not difficult: the soil moisture should be preserved, and the running vines not allowed either to root at the joints or to run to vine, while all very early solitary blossoms should be picked off, for the sake of bringing on a later uniform crop. Storage of the winter Squashes depends for success upon not bruising them, and upon not starting the stem, as well as upon protection from frost. Pests and diseases are troublesome.

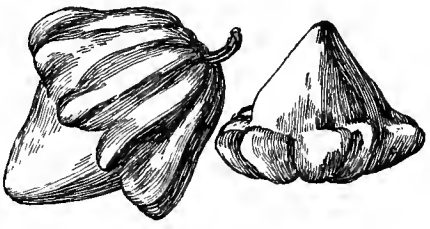

Fig. 121. Pineapple summer Squash, of the pattypan type.

Fig. 122. Summer Bergen Squash. *C. Pepo.*

Soil should be "quick," warm, and well drained, but

not dry. Hills may be specially prepared by mixing compost with the earth in a space eighteen inches or more across, or by filling the entire space with compost, but much manure or nitrogen is not advisable, as the plants will be likely to run to vine. See also under Soil for Muskmelon.

Fig. 123. Summer Crookneck Squash. *C. Pepo.*

Distances are according to variety, hills of bush varieties three to five feet apart each way, of running kinds six to nine feet. Give as much room as can be spared, especially in good soil.

Depth.—About one inch.

Sow under glass three to four weeks before the time of setting out, which should be when frosts are past. Or sow in the open, where the plants are to stand, under hand-glasses, the first week in May. Sow without protection about June 1. There should be ten to twelve seeds to the hill. Under glass sow in pots or on inverted sods, as Squashes transplant poorly, five to six seeds to each recep-

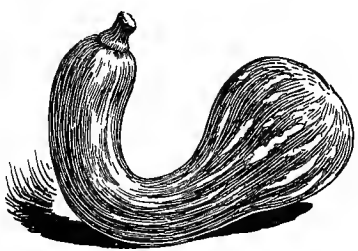

Fig. 124. Winter Crookneck Squash. *C. moschata.*

tacle, thin to one. Or sow in berry-boxes and set out box and all.

Thin when danger from pests is over, to three plants in the hill.

Set out house-grown plants when frosts are past, three to the hill.

Culture.—Preserve the surface mulch, and prevent running varieties from rooting at the joints, as they would then grow rather than make fruit. If the plants, after flowering, run too much to vine, pinch them back to force fruiting. If one fruit sets much earlier than the others, pick it off, for the sake of a uniform crop. For best results, pick off all blossoms from a plant after two or three fruits have set, and pinch back all ends.

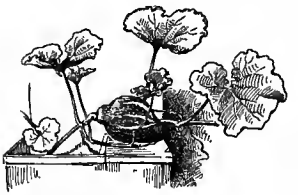

Fig. 125. Hubbard Squash.

Fertilizer.—It is better to depend upon a well-enriched soil than to fertilize after the plants have started. A little quick-acting fertilizer under the seeds in the hill (but not touching them) will help the start, but nitrogen added later in available form will produce vines rather than fruit.

Pick summer varieties when ripe. Pick winter kinds, for storage, when almost ripe, taking care not to start the stem, and leave them in the sun to dry; the end of the stem should dry as soon as possible. Then

Store in a well-aired, dry house or cellar, away from frost, the temperature preferably at about 50 degrees, 45 to 65 degrees being the safe range. In transportation, take care not to bruise the Squashes.

Diseases.—Are the same as of cucumber, which see.

Pests.—The striped cucumber beetle is, until the plants grow too large for it, the worst foe of the Squash, and four-fifths of the vines are likely to go if the bugs are numerous. Treat as under cucumber, except that Squash follows Squash. Hand covers may be used. The squash bug is another bad enemy; treat in the same way, pick by hand, and trap at night under chips or shingles left near the plants, under which the insects will hide. Burn all vines after harvest, or plow them under. In small plantations, hunt for the eggs, which are very visible in large patches on the under sides of the leaves; tear off the part of the leaf and destroy.

Fig. 126. Common Pumpkin. *C. Pepo.*

For melon-louse use methods as under Cucumber and Muskmelon.

For root-borer catch the moths. These are about an inch in spread, very dark brown with an olive sheen, and settle at the base of the leaves at twilight. Help the joints root by covering with earth; they will then

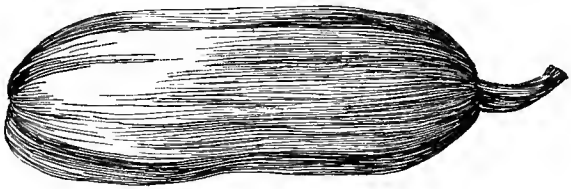

Fig. 127. Vegetable Marrow. *C. pepo.*

better withstand the pest. Plant trap crops of early-fruiting varieties, and when the fruits are picked burn the vines, roots and all. Cut out the borers from the vines and roots by splitting these lengthwise, then cover the injured parts with earth; avoid infested ground; harrow lightly in fall and plow deeply in spring. Feed well and keep the plants free of diseases and other pests.

SQUASH, GUINEA. See Eggplant.

STACHYS TUBERIFERA, or Chinese or Japanese Artichoke, sometimes called Chorogi or Knotroot, is a tuber-bearing type of the *Stachys* group of plants, and has been grown in two varieties, the *Sieboldi* and the *Floridana*, though in general very little known. The

tubers may be left in the ground through an ordinary winter, and should be dug only when wanted, as they soon spoil upon exposure to the air. They come to full size very late in the season, continuing to grow as long as the tops are green.

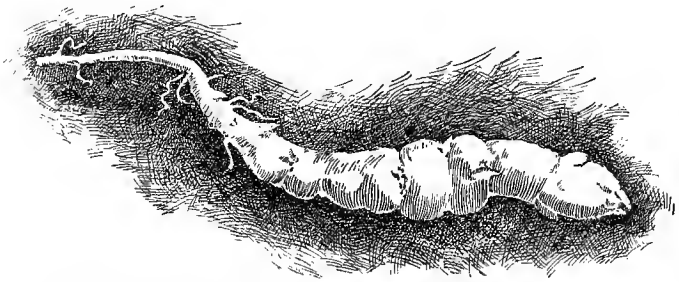

Fig. 128. Tuber of Stachys tuberifera. Three-fourths natural size.

Soil light and quick.
Distances.—One foot each way.
Depth.—Cover about two inches.
Set tubers when heavy frosts are past.
Cultivate regularly.
Dig as wanted after the tops die down.
If stored, keep in moist sand.
Use.—Fry, or use in salad.

STAR OF THE EARTH. See Buck's Horn Plantain.

ST. PETER'S HERB. See Samphire.

STRAWBERRY BLITE, our common weed (*Chenopodium capitatum*), is sometimes grown in gardens as a pot-herb. Cultivate like Spinach.

SUCCORY. See Chicory.

SUGAR-BEET. See Beet, Sugar.

SWEET CICELY, or Sweet-scented Chervil (*Myrrhis odorata*), is a hardy perennial whose leaves are used in salads; they have a strong aniseed flavor. In France the roots are used in soups.

Soil.—Any good garden earth.

Distances.—Rows one foot apart in seed-bed. Permanent distances two feet each way.

Depth.—One inch.

Sow in autumn, as soon as the seeds are ripe. Spring-sown seed is likely to fail.

Thin to three inches in the seed-bed.

Transplant when growing well, at five or six inches, to the permanent distances. Or wait until the following spring.

Set root-divisions in spring.

Culture.—Give ordinary care.

Pick the leaves or dig the roots as wanted.

Mulch lightly in winter.

Reset or renew every few years.

SWEET POTATO (*Ipomœa Batatas*) is a tender plant grown for its tuberous roots. North of New Jersey it is seldom grown except by amateurs, as it requires a long season. The plants are started from tubers set in a mild hotbed; sprouts (or "draws") will rise and root themselves, when they are cut off without disturbing the potatoes, which send up a second crop. From the sprouts when set in the field vines will spring, and by cuttings taken from their tips, more vines may be propagated. The plant requires a rich, loose soil, preferably deep; culture is simple, but diseases are troublesome; the tubers should be dug as soon as the vines have been touched with frost, and should be stored out of the reach of frost. Varieties are exceedingly numerous and difficult of classification; there is a vineless kind.

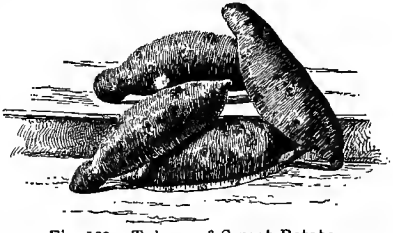

Fig. 129. Tubers of Sweet Potato.

Soil rich, light, loose and quick. Stable manure may be used, or a fertilizer of nitrogen 3 per cent, phosphoric acid 7 per cent, potash 12 per cent (Voorhees). Either should be well worked into the soil before the sprouts are set, and may be put along the rows.

Distances.—Set sprouts or cuttings eighteen inches by two to three feet.

Depth.—Set sprouts deeper than before. Cover cuttings (usually laid nearly horizontally) all but their tips.

Sprouting.—The potatoes (large or small) are usually laid in a mild hotbed three to four weeks before frosts will pass. Use whole tubers, cover with three to four inches of light earth. When the sprouts are four to five inches long, and well rooted, break them from the tubers and set them in the field. Take subsequent sprouts until no more appear. In the North seedsmen sell sprouts.

Cuttings are made from the tips of young vines, and are taken six to nine inches long.

Cultivate regularly until the vines cover the ground. Allow the vines to root.

Dig as soon as the vines are touched with frost. A heavy frost is likely to spoil the tubers.

Store in sand in boxes away from frost. In the South the potatoes are stored in piles of from thirty to fifty bushels, covered with earth but well ventilated, usually with drain-pipes.

Diseases are particularly various kinds of rot, for which practice rotation, reject (in planting or storing) all diseased plants, dig when the weather is dry, handle with great care, and if possible in padded baskets. Against soil rot use sulphur and kainit mixed, 300 to 400 pounds of each per acre, well worked into the soil. Against black rot do not set in the field any affected

sprouts, but plant them in a seed-bed and use cuttings to make the plantation. Against leaf-spot, and white or leaf-mold, Bordeaux.

Pests.—Against beetles use arsenites, against cut-worms poisoned baits (see under Cabbage).

TAGETES LUCIDA. See under Tarragon.

TANSY, sometimes called Buttons, is *Tanacetum vulgare*, a hardy herbaceous perennial formerly used in domestic medicine and in seasoning puddings and omelettes. It is tall and rank-growing, persistent and likely to spread; as it exhausts the soil, it should be replanted elsewhere, every few years; a few plants are all that are necessary in any garden, except for the showy effect when in bloom. There are two varieties, the Common and the Curled; the latter is preferable, and is handsome for garnishing.

Soil.—Any good earth, if well drained.

Distances.—Rows two feet apart; plants in the row twelve to eighteen inches.

Sow when the ground is fit. Thin when growing well, at three or four inches.

Depth of seed, one-half to one inch. Of roots or slips, as before.

Set root-divisions in spring.

Take cuttings in summer, and water till established. Transplant in fall or spring.

Culture.—Give ordinary care, and keep from spreading. For best leaf growth pinch off all flower-buds.

Pick the leaves as wanted. The flowers are sometimes used in domestic medicine.

Reset in new ground every two or three years.

TARRAGON (*Artemisia Dracunculus*) is a perennial plant grown for its leaves and tender tips, used in seasoning, in the making of Tarragon vinegar, and of oil of Tarragon. It is one of the best of the aromatic plants, and in Europe is much used. In America it is tender, and needs winter protection in the North. The leaves and tips when fresh are steeped in vinegar to make Tarragon vinegar, or are cut up for seasoning, or may in the fall be picked and dried for winter use. It is also possible to take the plants into the house for use as needed. The true Tarragon does not produce seed, but an inferior Russian variety does, and its seed is occasionally offered for sale. The plants of true Tarragon may be bought of seedsmen in spring and early summer. Sweet-scented Marigold (*Tagetes lucida*) is sometimes used, and very satisfactorily, as a substitute for Tarragon.

Soil.—Any good garden soil that is not wet; Tarragon does better in a poor soil than in a rich one. It likes sun.

Distances.—Plants one foot apart each way.

Depth, as before.

Set root-divisions in spring.

Take cuttings or slips in spring or summer, and water till established.

Culture.—Give ordinary care; cut off all flower stems.

Pick the leaves and tips as needed when once the plants are well established. They are best when the plants are ready to flower. For making Tarragon vinegar, soak the leaves and tips in good vinegar. In the fall cut down the plant and dry the leaves.

Mulch over winter.

Reset the plantation every few years, in fresh soil.

THISTLE, GOLDEN. See Scolymus.

THOROUGHWORT (*Eupatorium perfoliatum*) is a perennial herb grown for its leaves, used in infusion as a tonic. Other of the species are *E. cannabinum*, hemp agrimony, and the bitter-bush, *E. villosum*, which are similarly grown.

Soil preferably moist.

Distances two by two feet.

Depth of seed, an inch; of roots, as before.

Sow when the ground is fit. Thin when well up.

Set root-divisions in spring.

Pick for use as wanted. Or dry and store.

THYME is *Thymus*, a perennial plant grown in two varieties, the Common (*T. vulgaris*) and the Lemon

(*C. citriodorus*), the latter a creeping plant about four inches high. Of the common Thyme there are also narrow- and broad-leaved varieties. The plant is propagated by seeds, root-divisions and (especially in the case of the Lemon Thyme) by layers. Wild Thyme, or Mother-of-Thyme, may be brought into gardens. Thyme is often grown as an edging.

Soil light and warm.

Rows one foot apart.

Depth one inch. Of divisions or rooted layers as before.

Sow when heavy frosts are past.

Thin to six inches apart in the rows.

Transplant in fall or spring.

Set root-divisions or lift layers in spring.

Pick the leaves and tender tips as wanted for use in seasoning. Or dry and store.

Renew every three or four years.

TOBACCO, cultivated chiefly commercially, is not considered here.

TOMATO, formerly called Love-Apple (*Lycopersicum esculentum*), is a semi-tropical annual plant grown for its fruits, which are among the most popular of our vegetables, although the belief that the Tomato was poisonous did not allow its cultivation and development until within the nineteenth century. Now it is

grown on a great scale, and excellent strains have been developed, entirely superseding the smaller angular fruits of earlier days. As a tender plant, the Tomato

Fig. 130. Seedlings of Tomato. Two-thirds natural size.

cannot be very successfully grown in the North unless it is started under glass, eight to ten weeks before it can be set in the field. To develop stocky plants, two or three transplantings are usual; and as the Tomato transplants poorly, pots are better for use than flats, although seedsmen offer the plants in boxes of a dozen or more, late in the spring. As in the case of celery, the plants are best grown at home, with great care to make sure that they suffer no check, and also to prevent them from growing too tall for their strength. Under the best conditions, Tomatoes may be advanced as far as to

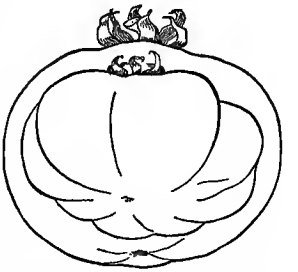

Fig. 131. Old and new types of Tomato. Note the differences in size and shape.

be bearing fruit before they are set in the field, but with ordinary house or frame conditions this is best not attempted. When set out, after frosts are past, Tomatoes should be given a light dressing of nitrate of soda

Fig. 132. Modern Tomatoes, large and round.

or of liquid manure and should have the best of cultivation. Training the plants produces early fruits, and generally speaking it is always best to give Tomatoes some kind of support, to allow the fruits to develop and to prevent them from rotting on the ground. The best results are obtained from Tomatoes trained upright, and pruned to a single stem, care being taken to pinch off all side shoots, and after three clusters of fruits have set to pinch off all subsequent blossoms. By this method the earliest fruits are produced, and the Tomatoes are more regular in size. Other methods are training to two or three stems. For such training

the plants are tied to stakes, or to trellises, made of wood or wires. Less care is necessary when the plants are kept off the ground by means of wire or wooden supports, such as can be bought or made at home; over them the plants are allowed to grow at will, but so much of care as will keep the fruits from being too much shaded by the leaves is always worth giving. Late in the season, also, say about the first of September, it is well to cut off all growing tips and all blossoms which have not set fruit. The simplest method of tomato-growing is to let the plants sprawl upon the ground; this is the common commercial method, but it has been proved that such plants produce less weight of fruit and that more of it is lost through rot. If the ground is mulched before the plants cover it, more fruit is produced, but it will rot more. At the same time, vines which lie upon the ground are most easily covered against early frosts. Varieties of Tomatoes are several, including the Currant (*L. pimpinellifolium*) Cherry, Peach, Pear and Plum, and the Common. Strawberry or Husk Tomatoes (which see below) are a different plant. The Common Tomato has been developed into many strains, suitable for all conditions, varying in characteristics from dwarf to tall-growing, deep red in color through yellow to almost white, and of sizes varying from medium to very large. Diseases and pests are not very troublesome.

Young Tomato plants are always for sale in spring

by seedsmen and most provision dealers. Named varieties are best; buy them of seedsmen.

Soil should be rich and quick, and not too dry. Tomato should not be highly fed with nitrogenous

Fig. 133. A spray of Tomatoes.

manures, therefore it does best on ground that has been well manured in the previous year, rather on a plot that has just been manured. If barnyard manure is used at all, it should be well composted, and not applied in

large quantities, or it will cause too late fruiting. Chemical fertilizers should be applied in proportion to the manure used, and generally speaking should be rich in potash. Nitrate of soda is especially valuable with Tomatoes, but should be properly given; if much manure has been dug in, the nitrate should be less, and vice versa. For an especially early crop a light warm loam should be chosen, and the nitrate applied at the rate of 150 to 250 pounds per acre, at the time of setting out. For a general crop a slightly heavier loam may be chosen, and the nitrate applied at the rate of 200 pounds per acre in three equal dressings, the first at setting out, the others at intervals of about three weeks. Tomato soil should be in good tillage at the time of setting out.

Distances are somewhat according to variety, but chiefly according to methods of training. The rows should be three to four feet apart. If the plants are to be trained to a single stem, they may be set eighteen inches or even closer in the rows. If they are to be pruned to two or three stems, set farther apart, until if they are to be allowed to cover the ground set three by three or four by four feet according to the richness of the ground.

Depth.—Sow in the flats or frame about one-eighth inch deep. Outdoors one-half to one inch deep.

Sow under glass about the middle of March, or from six to ten weeks before the time of setting out,

which is about June 1 at the latitude of New York. Outdoor sowings are rare in the North and are not safe until frosts are past except in very sheltered situations or else where protection can be given.

Fig. 134. A uniform crop of good Tomatoes. The result of training to a single stem.

Prick out once or twice, but preferably transplant into pots, the first transplanting soon after the second leaves develop, or as the plants crowd; repot as the plants grow.

Keep the plants growing steadily from the first, by regular watering and transplanting.

Set out when danger of frosts is over, about June 1, according to the season. If they are "leggy," cut back at setting out, or set deep, or tie at once to support. Dress with nitrate of soda as above.

Culture should be regular and constant.

Fertilize as above, under Soil.

Training should begin as soon as the plants are tall enough to be in danger of being broken down by wind. Tie to stakes or trellis by raffia or soft string, passing once around the stem and taking care not to wrap so tight that the plant cannot enlarge. Tie again as the plants grow, and prune according to the system chosen. Training to stakes requires pruning in order to be successful.

Fig. 135. Tomato trained to a stake. Note that the stake should be stout.

Pinch off the ends of the vine and side shoots if the plant is growing too fast without setting fruit. At about the first of September pinch off ends, and all blossoms, so that the fruit already set shall be matured.

Pick all fruits as soon as they ripen, whether needed or not.

Protection against frost is possible by covering the vines with cloths or mattings at night; in the home garden the yield may be thus prolonged for some time,

At the approach of heavy frosts, vines may be pulled entire and hung indoors, when they will often mature the fruit that remains on them. Or the unripe fruit may be picked and put in closed drawers or boxes to ripen.

Forcing of Tomatoes is now quite general; hand pollenation is necessary; pruning to a single stem is advised.

Diseases are serious chiefly in the greenhouse. In the field the most troublesome are blight and rot. For blight, Bordeaux, rotation and the burning of diseased vines are recommended; for rot, get the sun and air to the fruit by training and pruning, and spray with Bordeaux. For scab, keep from the ground and spray with Bordeaux.

Pests.—The Tomato is troubled occasionally by insects which prey chiefly on other plants. See under the other headings in this book. Against the Tomato-worm use Paris green, or any stomach poison, or pick by hand. Against corn-worm, systematic fall plowing; burn affected fruits. Against cutworm and white grubs, see under Cabbage. Against Tomato-borer, clean culture, cut the larvæ out of any weakened plant.

TOMATO, STRAWBERRY. The Strawberry or Husk Tomato, with various allied plants called by such names as Cape Gooseberry, Dwarf Cape Gooseberry, Barbadoes Gooseberry, Chinese Lantern Plant,

Ground Cherry, are all species of *Physalis*, grown in much the same manner, for their fruits, used for eating raw, cooking and preserving. The fruits can be dried in their husks and will keep for some months. According to the Cyclopedia of American Agriculture, they classify best as follows. Most important is *P. pubescens* (Strawberry or Husk Tomato, Ground Cherry, Dwarf Cape Gooseberry), the one most grown, as being early and free-fruiting. It is a sprawling plant. The Cape Gooseberry is *P. Peruviana*, of too slow development for general use in the North, and little offered by seedsmen. *P. ixocarpa* is also not satisfactory for garden use, although showy. Chinese Lantern Plant is *P. Francheti*, a very handsome, upright-growing plant. These plants are all annuals. The Winter or Bladder Cherry, or true Strawberry Tomato, is *P. Alkakengi*, a perennial, of low growth and handsome fruitage, but not truly hardy except in favorable situations, and well protected. It is usually treated as an annual.

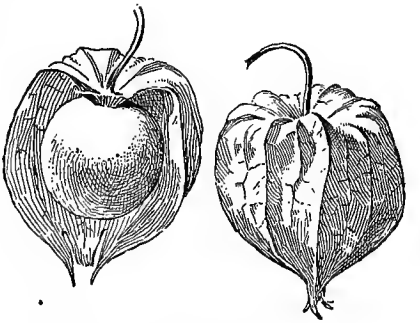

Fig. 136. Strawberry or Husk Tomatoes. Natural size.

Soil.—Any good garden soil, preferably light, warm and quick.

Distances.—Set plants about two by two feet, or up to four by four feet in rich ground.

Depth.—Outdoors, one-half inch. Indoors, one-fourth inch.

Sow under glass early in April, and transplant as the seedlings grow. Sow outdoors in seed-bed when

Fig. 137. *Physalis pubescens.* The fruits one-third natural size.

frosts are past, thin to three inches apart in the drills and at five to six inches set in permanent positions.

Pick the fruits when ripe. Dry in the sun those wanted for later use, or else preserve.

TREE PRIMROSE. See Evening Primrose.

TURNIP (*Brassica rapa*) is a hardy biennial grown for its roots, usually as a spring and fall crop. It is managed much like other root-crops when in the ground, but early planting is desirable for the first crop, for if the plant does not grow quickly and con-

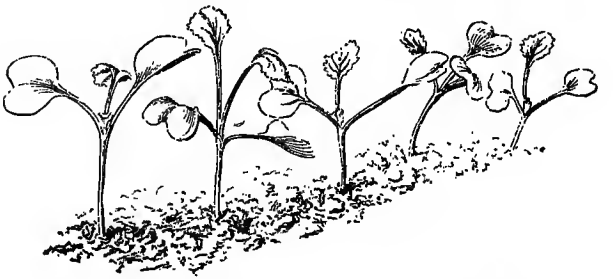

Fig. 138. Turnip seedlings. Two-thirds natural size.

tinuously it is likely to be stringy, while it suffers in heat. Proper soil and thinning are necessary in Turnip culture. Varieties are many, depending upon the shape of the roots, which vary from long through short to round and flat. Diseases and pests are sometimes troublesome.

Soil.—Should be rich and cool, not recently manured and in fine condition.

Distances—Rows a foot apart or more. Thin to stand finally to six to nine inches in the row, according to variety, by two or three thinnings; the pulled plants may be eaten.

Depth.—One-half to one inch.

Sow in spring as soon as the ground is fit. Sow again in late July for the fall crop.

Cultivate until the tops cover the ground.

Fertilize with nitrate of soda, 300 pounds per acre in two equal dressings, one at or soon after sowing (keep the nitrate from seed or seedlings!) and the other three or four weeks later. Or dress lightly every week. For a general fertilizer, per acre, "20 pounds of nitrogen (derived in part from nitrate of soda), 40 pounds of phosphoric acid (derived in large part from phosphates) and 40 pounds of potash. (derived from muriates) would be a fair dressing on soils of good character."—Voorhees. This should be worked into the soil before sowing.

Fig. 139.
Turnip, the flat type.

Dig early plants when of proper size. Dig fall crop before the ground freezes. Turnips will live over winter in the ground, but the roots are often injured by freezing.

Diseases.—Club-root is the most troublesome; no satisfactory remedies have been found. It will be best not to plant upon infested ground until the disease has died out; or use only those varieties, such as the flat turnips, which grow well cut of, or sit upon, the surface of the ground.

Pests.—The root-maggot is the worst. In some soils the pest is so bad that Turnips cannot be grown. Carbon dioxide injected beside the roots will kill the pests, but the process is too expensive and laborious. Dress heavily after sowing with unleached ashes or with tobacco dust. See also Cabbage-maggot treatment. For flea-beetle: Bordeaux, alone or with soap; kerosene emulsion; arsenites; Paris green with land-plaster, one part to fifty.

TURNIP, SWEDISH. See Rutabaga.

UDO (*Aralia cordata*) is a Japanese salad plant of recent introduction by the Department of Agriculture, which will supply both seed and roots. The plant is grown in two varieties as follows:

(1) **Kan Udo** is grown from seed, and produces shoots much as Asparagus or Sea-Kale, but does this in the fall instead of the spring.

Soil.—Mellow loam, rich and deeply dug.

Sow in a seed-bed, rich and in good tilth, rows one foot or more apart.

Depth about one inch.

Thin when well up to three inches in the rows.

Transplant at six inches to permanent positions, in rich loam.

Distances four feet by eighteen inches.

Culture.—Feed well, and keep clear of weeds.

Fertilize with a high-grade general mixture.

Forcing.—In early September cut down the tops, which will have grown to four to five feet. Earth up the row with light soil, free of stones, to a height of eighteen inches. In forty to sixty days shoots will force their way through this, and should be cut at their first appearance. Remove the earth from around them and cut as low as possible, taking care not to injure the smaller shoots. Earth once more and cut the subsequent shoots when they have grown. Or instead of earthing, cover with boxes and cut the shoots when about twelve inches long.

Protection.—When the plants have ceased to bear, level the ground and mulch heavily with earth and straw, or best with several inches of fresh manure with its bedding, so that it shall not heat.

Spring treatment.—Remove the mulch. Dig the manure into the ground; or dress heavily with well-rotted manure. Feed with chemicals at intervals throughout the year.

Renewal.—A bed of Kan Udo should last for several years, according to its treatment. Renew when the plants show less vigor, from seed.

(2) **Moyashi Udo.** This is propagated from roots only, and is grown for forcing, to yield a winter vegetable.

Soil.—Rich garden loam. Plenty of manure and chemicals may be worked in.

Distances.—Set the roots four feet by eighteen inches.

Depth as before, the top of the root lightly covered with earth.

Culture.—Dress occasionally with a good general fertilizer and keep clear of weeds.

Forcing.— In the fall, when the tops are killed by frost, lift the roots, shake free of earth, and store by packing in straw away from frost, at a temperature of about 40°. Force when wanted as follows:

Make a trench three feet wide and two feet deep; pack in the bottom three inches of well-rotted manure, mixed with good earth. Over this put two inches of good earth, upon which set the roots upright and closely together. Cover the whole with earth, mounding it to a foot in height above the ground. Keep the ground watered.

Cut the shoots when they appear, in forty to sixty days, and continue cutting as long as they are produced.

Outdoor forcing is possible only in mild climates. Farther north force indoors in a similar manner, under a greenhouse bench, or in boxes in the cellar.

The roots are best forced in midwinter. It is likely that ether forcing (see under Rhubarb) will produce a greater yield, but it will exhaust the roots. Forced by the above method, and allowed to become dormant

again, the roots may be planted out in spring for use again in the following winter.

UNICORN-PLANT is Martynia, which see.

VALERIAN, AFRICAN. African or Algerian Valerian, is *Fedia Cornucopiæ*, a somewhat tender annual salad plant, similar to Corn Salad.

Soil rich and moist.

Rows one foot apart or more.

Depth about one inch.

Sow in May, June and July, successively.

Thin to nine to twelve inches in the rows.

Pick the leaves as wanted when the plant is well established or pull the whole plant at about eight weeks.

VEGETABLE MARROW. See under Squash.

VEGETABLE OYSTER. See Salsify.

VETTICOST. See Corn Salad.

VIPER'S GRASS. See Scorzonera.

WATER-CALTROP, or

WATER-CHESTNUT, (*Trapa natans*) is a hardy and attractive aquatic plant, which bears a fruit or nut

that may be eaten raw, roasted or boiled. The plant is seldom cultivated. An Indian species, *T. bispinosa*, bears the Singhara nut, well known in the East. It is cultivated like most aquatic plants, and cannot be said to come into the vegetable-garden at all.

WATER CRESS. See Cress, Water.

WATERMELON (*Citrullus vulgaris*) is a tender annual plant grown for its large fruits, which are more popular, and are better grown, in America than anywhere else in the world. Commercially, the Water-

Fig. 140. Watermelon seedlings. One-half natural size.

melon is grown almost exclusively in the South, although in home gardens in the North its culture is not difficult, especially if started early, under glass. Good soil, rotation, ordinary culture, thinning of the fruit, and protection against pests, are all necessary for good

results. Varieties are several. The Citron or Preserving Watermelon (see also Wax Gourd) is a hard-fleshed strain, used for sweet pickles and preserves. Diseases of Watermelon are not troublesome, but pests sometimes cause injury.

Soil.—Light, rich, quick, well drained, and in the best of tilth. It should not have too large a supply of nitrogen, as that will make the plants run to vine and is thought to diminish the sweetness of the fruit. For preparing hills, see Soil for Muskmelon.

Distances.—Hills eight by eight feet to twelve by twelve feet, according to the richness of the ground. Plant Preserving Melons eight by eight feet.

Depth.—One inch or less.

Sow under glass in April or early May, in pots or on inverted sods. Sow outdoors when frosts are past, about June 1. Set the seed eye down, ten to twelve to a hill, a few inches apart from each other in a little circle. Sow six to the pot.

Fig. 141. The common type of Watermelon.

Thin when well up to three or four plants in the hill, and when the vines are strong enough to resist insects thin again to two plants in the hill. Thin pots to one in the pot.

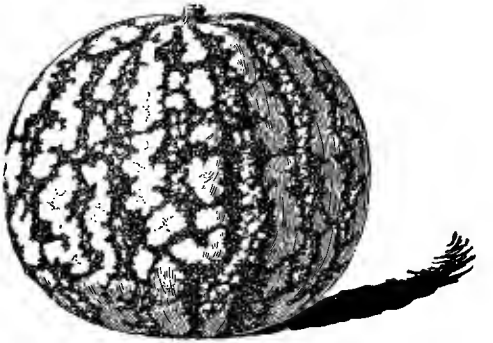

Fig. 142. The Citron or Preserving Watermelon.

Set out house-grown plants when frosts are past, two to the hill.

Cultivate with hand tools till the plants cover the ground.

Thinning of fruit will give the best results. Thin to one or two to the vine.

Fertilize at setting out, or when the seedlings are up, with a little nitrate of soda to each hill. It is sometimes the practice to set a flower-pot or drain-tile in the hill, and water nightly with weak solutions of nitrate of soda and phosphates. Or use liquid manure. These feedings with nitrogen should not be kept up

more than a month. A general fertilizer, applied at sowing or before, may analyze nitrogen 3.3 per cent, phosphoric acid 8.4 per cent, potash 7.5 per cent, applied at the rate of about 600 pounds per acre; follow with nitrate of soda as above, or with cotton-seed meal, dried blood, or ground tankage, in a few light doses.

Pick when the melons are ripe, which is when the white spot, where the fruit rests on the ground, turns yellow and rough; or when the fruit no longer gives out a ringing sound when struck by the hand.

Rotation is necessary for successful Watermelon culture.

Diseases are not serious. For anthracnose, see under Bean; for powdery mildew, see under Muskmelon.

Pests are much like those of Cucumber, which see. Starnes, speaking in the Cyclopedia of American Horticulture of Watermelon-growing in the South, advises spraying with Paris green (four ounces to fifty gallons water) twice or three times at intervals of a week, on the first appearance of the melon worm, cucumber beetle, and flea beetle, spraying intermediately for the melon louse with kerosene emulsion, or with kerosene and water, one part to twenty. See also Muskmelon pests.

WASABI (*Eutrema wasabi*) is the Japanese Horse-radish, which is so highly prized in its own country

that it is being introduced in America by the Department of Agriculture, which at present (1907) is distributing roots to make it better known. Its culture differs somewhat from the common Horse-radish; its taste is more fresh and sharp than our own; and its delicate green color makes it attractive.

Soil should be moist, with a constant supply of water; a gravelly clay is regarded as excellent. The Japanese consider that the plant needs shade. They are sometimes grown in running water, or in springy places in meadows.

Distances.—Eighteen inches by ten.

Depth.—Set the roots upright, covering lightly with earth.

Set out the roots, or suckers, in spring, or in the fall when the roots are dug.

Culture.—Fertilize occasionally with a mixture rich in nitrogen. Give clean culture for two years.

Dig the roots in the fall of the second year. Trim off the suckers, which save to use again.

Use.—Grate the roots and use like our horse-radish; or pickle in vinegar. In Japan the fresh leaves are used in the manufacture of pepper-sauce, by pouring hot water over them and allowing to stand for several hours.

WAX-GOURD, Zit-Kwa, or Chinese Preserving Watermelon (*Benincasa cerifera*) is a plant bearing a large fruit, hairy, and often with a waxy surface. Its

flesh is used like that of the Citron, for preserves and sweet pickles. Treat in all ways like Muskmelon, but allow only two fruits to grow on one vine.

Fig. 143. Wax-Gourd.

WOODRUFF (*Asperula oaorata*) is a seldom-cultivated perennial, offered by seedsmen among sweet herbs, and grown for its leaves, used in the flavoring of beverages. It is an ornamental plant, small, and preferring shade. It is sometimes grown as an edging.

Soil.—Moist, with partial shade.

Distances.—Rows one foot apart. Thin to six to nine inches in the row. Or sow broadcast in a bed.

Depth.—About one-half inch.

Sow when the ground is fit.

Thin at three inches.

Culture.—Preserve the surface mulch, and keep the plant from spreading.

Pick the leaves as wanted, when once the plant is well established.

WORMWOOD (*Artemisia Absinthium*) is a half-hardy perennial, grown for its leaves, formerly much used in medicine, and now a principal ingredient in absinthe; they are occasionally used in the kitchen for their bitter flavor. Wormwood is grown from seed, cuttings, or root-divisions. Varieties are the Common, the Roman (the mildest) and the Sea.

Soil light and well-drained, not especially rich, and if possible with partial shade but not a northerly exposure.

Distances.—Thirty to thirty-six inches each way.

Depth of seed about one-fourth inch. Of rooted cuttings or root-divisions, as before.

Sow the seed as soon as ripe, or in the spring, when heavy frosts are past. Sow in a seed-bed from which the seed will not wash out.

Thin at three inches to three inches apart. When six inches tall

Transplant to fifteen to eighteen inches apart each way. Later remove the alternate plants and rows, to make the permanent plantation.

Set root-divisions in spring.

Make cuttings in early summer; shade and water till established. Transplant in early fall or the following spring.

Pick the leaves as wanted, or cut a winter supply when the plant is coming into flower; dry it and store.

Protect over winter with a mulch.

YAM (*Dioscorea*) is a plant of several varieties, all grown for their tuberous roots, but mostly semi-tropical, so that few of them can be grown in the United States. The Jamaica Yams need for successful culture at least fifty inches of rainfall in a year, and must have a long season. Their "heads," or clusters of short roots, may be sprouted in coldframes, and set out when frosts are past, three in a hill, hills six to eight feet apart each way. After five to six months, or less if the heads have been well sprouted, new heads can be dug from under the old, care being taken to leave as many of the roots as possible undisturbed. Subsequent diggings are possible, three or more in all to each vine. In each hill a stake should be set, seven to eight feet tall, for the vines. Heads, if whitewashed, and not bruised or cut, will keep well. Of Jamaica Yams the "yampie" is best, the "negro yam" earliest but coarse.

Barbadoes Yams are again quite different, being either grown from cuttings of the tubers like white potatoes, or else sprouted in a coldframe like sweet potatoes. Field culture is exactly like that for sweet potatoes.

For the North the Chinese or Japanese Yam is of possible culture, being hardy. Plant the roots or rhizomes, about nine inches long, in hills six feet apart each way, and furnish each with a stake. Or the roots may be sprouted under glass for an earlier start, about the middle of April. Give good culture and water in a

drought. Train or tie the wires to the stakes. The "out" with this Yam is the depth to which its large roots descend, often to three feet, and thickening at the lower end, so that digging is difficult. As table vegetables these Yams compare favorably with potatoes.

ZIT-KWA. See Wax-Gourd.

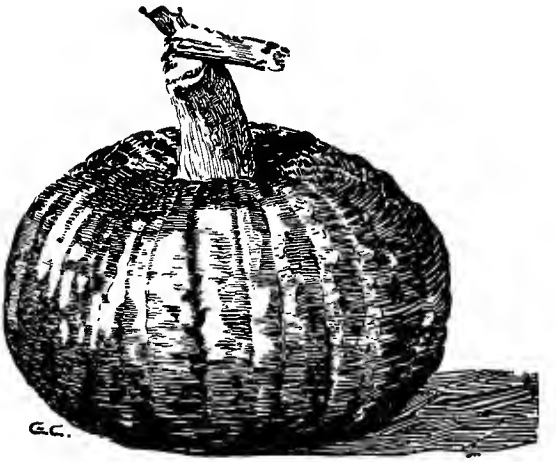

Fig. 144. Pumpkin, improperly picked. The stem should be cut clean. See page 264.

TABLE OF SEED-LONGEVITY AND OUNCE-VALUES

This table is necessarily incomplete and inaccurate, and is offered here for what it may be worth. The longevity table states the average number of years (calculating from the experiments of several investigators) after which it is not probable that seed can profitably be sown, the per cent of germination being small. The ounce-values have not been so carefully computed; see the Preface. Reliable corrections will be welcomed by the author.

Angelica. One to two years.
Anise. Three years.
Artichoke, Globe. Six years. 30 feet.
Asparagus. Five years. 300 feet.
Balm. Four years.
Basil. Eight years.
Beans, Broad. Six years. Quart, 100 feet.
Kidney. Three years. Quart, 150 hills.
Dwarf Kidney. Three years. Quart, 200 feet.
Lima, Pole. Quart, 100 hills.
Lima, Dwarf. Quart, 200 feet.
Beet. Six years. 60 feet.
Borage. Eight years.

Broccoli. Three years. 2,500 plants.
Brussels Sprouts. Three years. 3,000 plants.
Buck's-Horn Plantain. Four years.
Burdock, Edible. Five years.
Burnet. Three years.
Cabbage. Four years. 2,500 plants.
Caraway. Three years.
Cardoon. Seven years.
Carrot. Five years. 300 feet, if fresh.
Catnip. Five years.
Cauliflower. Three years. 3,000 plants.
Celeriac. Six years. 5,000 plants.
Celery. Seven years. 5,000 to 10,000 plants.
Chard. Six years. 50 feet.
Chervil, Salad. Two to three years. 150 feet.
Turnip-rooted. One year.
Chicory. One year. 100 feet.
Clary. Three years.
Collards. 3,000 plants.
Coriander. Six years.
Corn. Two years. Quart, 150 or more hills.
Corn-salad. Five years. 200 feet.
Cress, Common. Five years. 100 feet.
Upland. Three years.
Water. Five years.
Cucumber. Ten years. 75 hills.
Cumin. Two years.
Dandelion. Two years. 250 feet.

Dill. Three years.
Eggplant. Six years. 2,500 plants.
Endive. Eight years. 200 feet.
Evening Primrose. Three years.
Fennel, Common. Four years.
Sweet. Four years.
Florence. Four years.
Goosefoot, Annual. Four years.
Perennial. Five years.
Horehound. Three years.
Hyssop. Three years.
Iceplant. Five years.
Kale. Seven years. 250 feet. 2,000 plants.
Kohlrabi. Four years. 200 feet. 1,500 plants.
Lavender. Five years.
Leek. Two to three years. 150 feet.
Lentil. Four years.
Lettuce. Five years. 300 feet. 1,000 plants.
Lovage. Three years.
Mallow, Curled. Five years.
Jews. Five years.
Marigold. Three years.
Marjoram, Pot. Five years.
Sweet. Three years.
Martynia. One to two years. 100 hills.
Mugwort. Three years.
Muskmelon. Ten years. 75 hills.
Mustard. Four years. 60 feet.

Nasturtium. Four to five years. 50 feet.
Nigella Sativa. Three years.
Nightshade, both kinds. Five years.
Okra. Five years. 50 feet.
Onion. Two years. 100 feet.
Orach. Six years. 50 feet.
Parsley. Two years. 150 feet.
Parsnip. One year. 400 feet.
Pea. Three years. Quart, 100 feet.
Peanut. One year.
Pepper. Four years. 2,000 plants.
Purslane. Seven years.
Winter. Five years.
Radish. Five years. 125 feet.
Rocket. Four years.
Rosemary. Four years.
Rue. Two years.
Rutabaga. Six years. 200 feet.
Sage. Three years.
Salsify. Two years. 60 feet.
Samphire. Sow when ripe.
Savory, Summer. Three years.
Winter. Three years.
Scolymus. Three years. 70 feet.
Scorzonera. Two years. 80 feet.
Sea-Kale. One year. 300 plants.
Skirret. Three years.
Sorrel. Four years. 150 feet.

Spinach. Five years. 150 feet.
New Zealand. Five years. 50 feet.
Squash. Four years. Bush. 50 hills.
Running. 15 hills.
Tansy. Two years.
Thyme. Three years.
Tomato. Twelve years. 2,000 to 2,500 plants.
Strawberry. Four years.
Turnip. Eight years. 2,000 to 3,000 plants.
Valerian. Four years.
Wormwood. Four years.
Watermelon. Six years. 30 hills.

ADDENDA

Asparagus.—Select, for planting, the plants which have coarse roots and shoots, rejecting all which have fine roots and small though numerous shoots.

Cabbage Worm.—A favorite remedy with some Cabbage and Cauliflower growers is saltpeter, one ounce dissolved in three gallons of water. Sprinkle the heads thoroughly; one application is usually enough, unless soon washed off by heavy rains. The saltpeter will not discolor Cauliflower heads.

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